04 - QUADRATIC EQUATIONS

(Answers at the end of all questions)

(1) The value of a for which the sum of the squares of the roots of the equation $x^2 - (a - 2)x - a - 1 = 0$ assume the least value is

(a) 1 (b) 0 (c) 3 (d) 2 [AIEEE 2005]

(2) If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b^2 - 4c$ equals

(a) - 2 (b) 3 (c) 2 (d) 1 [AIEEE 2005]

(3) If both the roots of the quadratic equation $x^2 - 2kx + k^2 + k - 5 = 0$ are less than 5, then k lies in the interval

(a) $(5, 6]$ (b) $(6, \infty)$ (c) $(-\infty, 4)$ (d) $[4, 5]$ [AIEEE 2005]

(4) Let two numbers have arithmetic mean 9 and geometric mean 4. Then these numbers are the roots of the quadratic equation

(a) $x^2 + 18x + 16 = 0$ (b) $x^2 - 18x + 16 = 0$
(c) $x^2 + 18x - 16 = 0$ (d) $x^2 - 18x - 16 = 0$ [AIEEE 2004]

(5) If $(1 - p)$ is a root of quadratic equation $x^2 + px + (1 - p) = 0$, then the roots are

(a) 0, 1 (b) - 1, 1 (c) 0, - 1 (d) - 1, 2 [AIEEE 2004]

(6) If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + 12 = 0$ has equal roots, then the value of q is

(a) $\frac{49}{4}$ (b) 12 (c) 3 (d) 4 [AIEEE 2004]

(7) The number of real solutions of the equation $x^2 - 3|x| + 2 = 0$ is

(a) 2 (b) 4 (c) 1 (d) 3 [AIEEE 2003]

(8) The value of ' a ' for which one root of quadratic equation $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ is twice as large as the other is

(a) $\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $-\frac{1}{3}$ [AIEEE 2003]

(9) If roots of the equation $x^2 - 5x + 16 = 0$ are α, β and roots of the equation $x^2 + px + q = 0$ are $\alpha^2 + \beta^2$ and $\frac{\alpha\beta}{2}$, then

(a) $p = 1$ and $q = -56$ (b) $p = -1$ and $q = -56$
(c) $p = 1$ and $q = 56$ (d) $p = -1$ and $q = 56$ [AIEEE 2002]

(10) If α and β be the roots of the equation $(x - a)(x - b) = c$, $c \neq 0$, then the roots of the equation $(x - \alpha)(x - \beta) = c$ are

(a) a and c (b) b and c
(c) a and b (d) (a + b) and (b + c) [AIEEE 2002, IIT 1992]

(11) If one root of the equation $x^2 + px + q = 0$ is square of the other, then for any p and q it will satisfy the relation

(a) $p^3 - q(3p - 1) + q^2 = 0$ (b) $p^3 - q(3p + 1) + q^2 = 0$
(c) $p^3 + q(3p - 1) + q^2 = 0$ (d) $p^3 + q(3p + 1) + q^2 = 0$ [IIT 2004]

(12) If $x^2 + 2ax + 10 - 3a > 0$ for every real value of x, then

(a) $a > 5$ (b) $a < -5$ (c) $-5 < a < 2$ (d) $2 < a < 5$ [IIT 2004]

(13) If minimum value of $f(x) = x^2 + 2bx + 2c^2$ is greater than the maximum value of $g(x) = -x^2 - 2cx + b^2$, then for real value of x

(a) $|c| > |b|\sqrt{2}$ (b) $|c|\sqrt{2} > b$
(c) $0 < c < \sqrt{2}\,b$ (d) no real value of a [IIT 2003]

(14) The set of all real numbers x for which $x^2 - |x + 2| + x > 0$, is

(a) $(-\infty, -2) \cup (2, \infty)$ (b) $(-\infty, -\sqrt{2}) \cup (\sqrt{2}, \infty)$
(c) $(-\infty, -1) \cup (1, \infty)$ (d) $(\sqrt{2}, \infty)$ [IIT 2002]

(Answers at the end of all questions)

(15) The number of solutions of $\log_4(x - 1) = \log_2(x - 3)$ is

(a) 3 (b) 1 (c) 2 (d) 0 [IIT 2001]

(16) If α and β are the roots of the equation $x^2 + bx + c = 0$, where $c < 0 < b$, then

(a) $0 < \alpha < \beta$ (b) $\alpha < 0 < \beta < |\alpha|$
(c) $\alpha < \beta < 0$ (d) $\alpha < 0 < |\alpha| < \beta$ [IIT 2000]

(17) For the equation $3x^2 + px + 3 = 0$, $p > 0$, if one of the roots is square of the other, then p is equal to

(a) $\frac{1}{3}$ (b) 1 (c) 3 (d) $\frac{2}{3}$ [IIT 2000]

(18) If $b > a$, the equation $(x - a)(x - b) - 1 = 0$ has

(a) both roots in (a, b) (b) one root in $(-\infty, a)$ and the other in $(b, +\infty)$

(c) both roots in $(b, +\infty)$ (d) both roots in $(-\infty, a)$ [IIT 2000]

(19) The harmonic mean of the roots of the equation
$(5 + \sqrt{2})x^2 - (4 + \sqrt{5})x + 8 + 2\sqrt{5} = 0$ is

(a) 2 (b) 4 (c) 6 (d) 8 [IIT 1999]

(20) If the roots of the equation $x^2 - 2ax + a^2 + a - 3 = 0$ are real and less than 3, then

(a) $a < 2$ (b) $2 \leq a \leq 3$ (c) $3 < a \leq 4$ (d) $a > 4$ [IIT 1999]

(21) The equation $\sqrt{x + 1} - \sqrt{x - 1} = \sqrt{4x - 1}$ has

(a) no solution (b) one solution
(c) two solutions (d) more than two solutions [IIT 1997]

(Answers at the end of all questions)

(22) If p, q, r are positive and are in A. P., then the roots of the quadratic equation $px^2 + qx + r = 0$ are real for

(a) $\left| \frac{r}{p} - 7 \right| \geq 4\sqrt{3}$ (b) $\left| \frac{p}{r} - 7 \right| \geq 4\sqrt{3}$

(c) all p and r (d) no p and r [IIT 1995]

(23) Let f (x) be a quadratic expression which is positive for all real x. If g (x) = f (x) + f ' (x) + f " (x), then for any real x

(a) g (x) < 0 (b) g (x) > 0 (c) g (x) = 0 (d) g (x) ≥ 0 [IIT 1990]

(24) If α and β are the roots of $x^2 + px + q = 0$ and α^4 and β^4 are the roots of $x^2 - rx + s = 0$, then the equation $x^2 - 4qx + 2q^2 - r = 0$ has always

(a) two real roots (b) two positive roots
(c) two negative roots (d) one positive and one negative root [IIT 1989]

(25) Let a, b, c be real numbers, a ≠ 0. If α is a root of $a^2x^2 + bx + c = 0$, β is a root of $a^2x^2 - bx - c = 0$ and $0 < \alpha < \beta$, then the equation $a^2x^2 + 2bx + 2c = 0$ has a root γ that always satisfies

(a) $\gamma = \frac{\alpha + \beta}{2}$ (b) $\gamma = \alpha + \frac{\beta}{2}$ (c) $\gamma = \alpha$ (d) $\alpha < \gamma < \beta$ [IIT 1989]

(26) The equation $x^{\frac{3}{4}(\log_2 x)^2 + \log_2 x - \frac{5}{4}} = \sqrt{2}$ has

(a) at least one real solution (b) exactly three real solutions
(c) exactly one irrational solution (d) complex roots [IIT 1989]

(27) The equation $x - \frac{2}{x - 1} = 1 - \frac{2}{x - 1}$ has

(a) no root (b) one root
(c) two equal roots (d) infinitely many roots [IIT 1984]

(28) For real x, the function $\frac{(x - a)(x - b)}{(x - c)}$ will assume all real values provided

(a) a > b > c (b) a > b > c (c) a > c > b (d) a < c < b [IIT 1984]

(Answers at the end of all questions)

(29) If $a + b + c = 0$, then the quadratic equation $3ax^2 + 2bx + c = 0$ has

(a) at least one root in [0, 1]
(b) one root in [2, 3] and the other in [- 2, - 1]
(c) imaginary roots (d) none of these [IIT 1983]

(30) The number of real solutions of the equation $|x|^2 - 3|x| + 2 = 0$ is

(a) 4 (b) 1 (c) 3 (d) 2 [IIT 1982]

(31) If $a > 0$, $b > 0$ and $c > 0$, then both the roots of the equation $ax^2 + bx + c = 0$

(a) are real and negative (b) have negative real parts
(c) none of these [IIT 1980]

(32) Both the roots of the equation $(x - b)(x - c) + (x - a)(x - c) + (x - a)(x - b) = 0$ are always

(a) positive (b) negative (c) real (d) none of these [IIT 1980]

(33) If l, m, n are real, $l \neq m$, then the roots of the equation $(l - m)x^2 - 5(l + m)x - 2(l - m) = 0$ are

(a) real and equal (b) complex
(c) real and unequal (d) none of these [IIT 1979]

(34) The entire graph of the equation $y = x^2 + kx - x + 9$ is strictly above the X-axis if and only if

(a) $k < 7$ (b) $-5 < k < 7$ (c) $k > -5$ (d) none of these [IIT 1979]

(35) If α and β are roots of the equation $ax^2 + bx + c = 0$, then $(1 + \alpha + \alpha^2)(1 + \beta + \beta^2) =$

(a) 0 (b) positive (c) negative (d) none of these

(36) If the two equations $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$ have a common root, then the value of $(aq - bp)(br - cq)$ is

(a) $-(ar - cp)^2$ (b) $(ap - cr)^2$ (c) $(ac - pr)^2$ (d) $(ar - cp)^2$

(37) The set of values of p for which the roots of the equation $3x^2 + 2x + p(p - 1) = 0$ are of opposite signs is

(a) $(-\infty, 0)$ (b) $(0, 1)$ (c) $(1, \infty)$ (d) $(0, \infty)$

(38) If the roots of the equation $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ are equal, then a, b, c are in

(a) H. P. (b) G. P. (c) A. P. (d) none of these

(39) The value of p for which the difference between the roots of the equation $x^2 + px + 8 = 0$ is 2 are

(a) ± 2 (b) ± 4 (c) ± 6 (d) ± 8

(40) If $a > 0$, then $\sqrt{a + \sqrt{a + \sqrt{a + \ldots\ldots \infty}}} =$

(a) $\frac{1}{2}\sqrt{4a - 1}$ (b) $\frac{1}{2}\left[1 + \sqrt{4a - 1}\right]$ (c) $\frac{1}{2}\left[1 - \sqrt{4a - 1}\right]$ (d) none of these

(41) If for the quadratic equation $ax^2 + bx + c = 0$, the difference of the roots is the same as their product, then the ratio of the roots is

(a) $\frac{a - b}{a + b}$ (b) $\frac{b - c}{b + c}$ (c) $\frac{c - a}{c + a}$ (d) none of these

(42) The integral values of m for which the roots of the equation $mx^2 + (2m - 1)x + (m - 2) = 0$ are rational for rational k are given by

(a) $k(k + 1)$ (b) $\frac{k^2 - 1}{4}$ (c) $\frac{k(k + 2)}{4}$ (d) none of these

04 - QUADRATIC EQUATIONS

(Answers at the end of all questions)

(43) If $x^2 + 6x - 27 > 0$ and $-x^2 + 3x + 4 > 0$, the x lies in the interval

(a) (3, 4) (b) [3, 4] (c) (- 9, 3] $\cup$ [4, 9) (d) (- 9, 4)

(44) The roots of the equation $7^{\log_7 (x^2 - 4x + 5)} = x - 1$ are

(a) 2, 3 (b) 7 (c) - 2, - 3 (d) 2, - 3

(45) If 2, 3 are roots of the equation $2x^3 + mx^2 - 13x + n = 0$, then the values of m and n are

(a) - 5, - 30 (b) - 5, 30 (c) 5, 30 (d) none of these

(46) If $\sin\alpha$ and $\cos\alpha$ are the roots of the equation $ax^2 + bx + c = 0$, then

(a) $a^2 + b^2 - 2ac = 0$ (b) $a^2 - b^2 + 2ac = 0$
(c) $(a + c)^2 = b^2 + c^2$ (d) $(a - c)^2 = b^2 + c^2$

(47) If the equations $ax^2 + 2cx + b = 0$ and $ax^2 + 2bx + c = 0$ ($b \neq c$) have a common root, then $a + 4b + 4c =$

(a) 0 (b) 1 (c) - 1 (d) none of these

Answers

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
a	d	c	b	c	a	b	a	b	c	a	c	a	b	b	b	c	b	b	a

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
a	b	b	a	d	a,b	a	c,d	a	a	c	c	c	b	b	d	b	a	c	b

41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
b	a	a	a	b	b,c	a													