Shiksha Classes Bhandara

Mathematics **Topic : Quadratic Equation** **MM 100**

Q.1 If α, β are the roots of $x^2 + px + q = 0$ and also of $x^{2n} + p^n x^n + q^n = 0$ and if $\frac{\alpha}{\beta}, \frac{\beta}{\alpha}$ are roots of $x^n + 1 + (x + 1)^n = 0$ then n is

(A) An integer (B) An odd integer
(C) An even integer (D) None of these

Q.2 If α and β are the roots of $ax^2 + bx + c = 0$ and γ, δ are those of $x^2 + mx + n = 0$, find the equation whose roots are $\alpha\gamma + \beta\delta$ and $\alpha\delta + \beta\gamma$.

(A) $a^2\ell^2 \cdot x^2 - ab\ell m x + \ell n\,(b^2 - 2ac) + ac\,(m^2 - 2n\ell) = 0$
(B) $a^2\ell^2 \cdot x^2 - ab\ell m x - \ell n\,(b^2 - 2ac) - ac\,(m^2 - 2n\ell) = 0$
(C) $a^2\ell^2 \cdot x^2 + ab\ell m x - \ell n\,(b^2 - 2ac) + ac\,(m^2 + 2n\ell) = 0$
(D) None of these

Q.3 If the equations $4x^2 - 11x + 2k = 0$ and $x^2 - 3x - k = 0$ have a common root, then the value of k and common root is

(A) $0, \frac{17}{6}$ (B) $0, \frac{-17}{36}$
(C) 0, –17/6 (D) –17/6, 0

Q.4 Solve $2x^4 + x^3 - 11x^2 + x + 2 = 0$

(A) $\frac{1}{2}, 2, \frac{-3 \pm \sqrt{5}}{2}$ (B) $\frac{1}{2}, 3, \frac{-2 \pm \sqrt{5}}{2}$
(C) $\frac{1}{4}, 2, \frac{-1 \pm \sqrt{3}}{2}$ (D) None of these

Q.5 If the equations $ax^2 + bx + c = 0$ and $5x^2 + 12x + 13 = 0$ have a common root, where a, b and c are the sides of a triangle ABC, then –

(A) Δ ABC is acuted angled
(B) Δ ABC is right angled
(C) Δ ABC is isosceles
(D) Δ ABC is right angled isosceles

Q.6 Determine the values of m for which the equation $5x^2 - 4x + 2 + m(4x^2 - 2x - 1) = 0$ will have equal roots

(A) 1 (B) 2
(C) 3 (D) 4

Q.7 The values of 'a' for which both roots of the equation $x^2 - 6ax + 2 - 2a + 9a^2 = 0$ exceeds 3 are

(A) a < 1 (B) a > 1
(C) a < 11/9 (D) a > 11/9

Q.8 Find n in order that the equations $mx^2 + 5x + 2 = 0$ and $3x^2 + 10x + n = 0$ may have both the roots common.

(A) 1 (B) 2
(C) 3 (D) 4

Q.9 If $\sqrt{2x-3} - \sqrt{5x-6} + \sqrt{3x-5} = 0$, then x is equal to

(A) 7/6 (B) 2
(C) (7/6, 2) (D) [7/6, 2]

Q.10 If α, β are roots of the equation $ax^2 + 3x + 2 = 0$ (a< 0), then $\alpha^2/\beta + \beta^2/\alpha$ is less than-

(1) 1 (2) 2
(3) 3 (4) –1

(A) 1, 2 and 3 are correct (B) 1 and 2 are correct
(C) 2 and 4 are correct (D) 1 and 3 are correct

Q.11 If α and β are roots of the equation $x^2 + px + q = 0$ and α^4 and β^4 are roots of $x^2 - rx + s = 0$, then choose the correct options for the roots of $x^2 - 4qx + 2q^2 - r = 0$

(A) both real (B) one imaginary and one real
(C) both imaginary (D) None of these

Q.12 If [.] represents greatest integer function, then $2\,[x]^2 - 3x + 1 = 0$ is true for –

(A) no real value of x (B) $-1 \le x < 2$
(C) $x \in R$ (D) $x \in (\pi/e, 2)$

For Q.13-Q.15

af (μ) < 0 is the necessary and sufficient condition for a particular real number μ to lie between the roots of a quadratic equation f (x) = 0, where f (x) = $ax^2 + bx + c$. Again if f (μ_1) f (μ_2) < 0, then exactly one of the roots will lie between μ_1 and μ_2.

Q.13 If | b | > | a + c |, then –

(A) one root of f (x) = 0 is positive, the other is negative
(B) exactly one of the roots of f (x) = 0 lies in (–1, 1)
(C) 1 lies between the roots of f (x) = 0
(D) both the roots of f (x) = 0 are less than 1

Q.14 If a (a + b + c) < 0 < (a + b + c) c, then –

(A) one root is less than 0, the other is greater than 1
(B) exactly one of the roots lies in (0, 1)
(C) both the roots lie in (0, 1)
(D) at least one of the roots lies in (0, 1)

Q.15 If (a + b + c) c < 0 < a (a + b + c), then –

(A) one root is less than 0, the other is greater than 1
(B) one root lies in $(-\infty, 0)$ and other in (0, 1)
(C) both the roots lie in (0, 1)
(D) one root lies in (0, 1) and other in $(1, \infty)$

Q.16 The equation $2^{2x} + a\,2^{x+1} + a + 1 = 0$ has roots of opposite signs then exhaustive set of value of 'a' is –

(A) a < 0 (B) $a \in (-\infty, -2/3)$
(C) $a \in (-\infty, 1/3)$ (D) $a \in (0, 1/3)$

Q.17 If α, β are the real roots of $x^2 + px + q = 0$ and α^4, β^4 are the roots $x^2 - rx + s = 0$, where p, q, r, s $\in$ R, then choose the incorrect option –

(A) $(p^2 - 2q)^2 - 2\sqrt{s} = r$ (B) $(p^2 - 2q)^2 - 2q^2 + r = 0$
(C) $p^4 + 2\sqrt{s} - 4p^2q - r = 0$ (D) $p^4 + 2q^2 - 4p^2q - r = 0$

Q.18 Let a, b, c $\in Q^+$ satisfying a > b > c. Which of the following statement is incorrect for the quadratic polynomial

f (x) = (a + b – 2c) x^2 + (b + c – 2a) x + (c + a – 2b) ?

(A) The mouth of the parabola y = f (x) opens upwards
(B) Both roots of the equation f (x) = 0 are rational
(C) x-coordinate of vertex of the graph is positive
(D) Product of the roots is always negative

Q.19 The quadratic equation, whose roots are A.M. and H.M. between the roots of the equation $ax^2 + bx + c = 0$, is –

(A) $abx^2 + (b^2 + ac)\,x + bc = 0$
(B) $2abx^2 + (b^2 + 4ac)\,x + 2bc = 0$
(C) $2abx^2 + (b^2 + ac)\,x + bc = 0$
(D) None of these

Q.20 The largest interval in which $x^{10} - x^7 + x^4 - x + 1 > 0$ is-

(A) $[0, \infty)$ (B) $(-\infty, 0]$

(C) $(-\infty, \infty)$ (D) None of these

For Q.21-Q.25 :

The answer to each question is a NUMERICAL VALUE.

Q.21 The number of the real solutions of the equation $x^2 - 5|x| + 6 = 0$ is

Q.22 Number of real roots of equation $3^{\log_3(x^2-4x+3)} = x - 3$ is

Q.23 If one root of the equations $ax^2 + bx + c = 0$ and $bx^2 + cx + a = 0$ $(a, b, c \in R)$ is common, then the value of $\left(\frac{a^3 + b^3 + c^3}{abc}\right)^3$ is –

Q.24 The number of solutions of the equation $2x^2 + 9|x| - 5 = 0$ is

Q.25 The value of $\sqrt{7 + \sqrt{7 - \sqrt{7 + \sqrt{7 ... \infty}}}}$ is

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