

Quadratic Equations & Inequations

Miscellaneous Question bank	Level - 1
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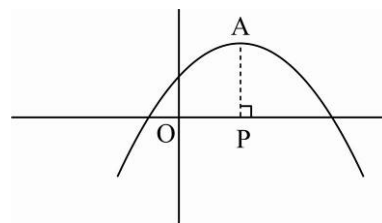
1. The coefficient of x in a quadratic equation $x^2 + px + q = 0$ was taken as 17 in place of 13 and its roots were found to be -2 and -15 . The roots of the original equation are :
(A) 2, 15 **(B)** 10, 3 **(C)** $-10, -3$ **(D)** $-2, -15$
2. If x, a, b, c are real and $(x - a + b)^2 + (x - b + c)^2 = 0$, then a, b, c are in :
(A) H.P. **(B)** G.P. **(C)** A.P. **(D)** None of these
3. If the roots of the equation $\frac{1}{x+p} + \frac{1}{x+q} = \frac{1}{r}$ are equal in magnitude and opposite in sign, then $p+q+r$ is equal to:
(A) r **(B)** $3r$ **(C)** r^2 **(D)** $2r^2$
4. All the values of m for which both roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ are greater than -2 but less than 4 , lie in the interval :
(A) $-1 < m < 3$ **(B)** $1 < m < 4$ **(C)** $-2 < m < 0$ **(D)** $m > 3$
5. The roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are :
(A) Real **(B)** Real and equal
(C) Real and not equal **(D)** Imaginary
6. The maximum value of $\frac{x}{x^2 - 5x + 9} \forall x \in R$ is :
(A) $-\frac{1}{11}$ **(B)** -1 **(C)** $\frac{1}{11}$ **(D)** 1
7. The value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assumes the least value is :
(A) 0 **(B)** 1 **(C)** 2 **(D)** 3
8. If $x = \sqrt{7+4\sqrt{3}}$, $x + \frac{1}{x}$ is equal to:
(A) 4 **(B)** 6 **(C)** 3 **(D)** 2
9. If one root of $x^2 - x - k = 0$ is square of the other, then k is equal to:
(A) $2 \pm \sqrt{3}$ **(B)** $3 \pm \sqrt{2}$ **(C)** $2 \pm \sqrt{5}$ **(D)** $5 \pm \sqrt{2}$

Paragraph for Q. 10 to 11

A polynomial $P(x)$ of third degree vanishes when $x = 1$ and $x = -2$. This polynomial has the values 4 and 28 when $x = -1$ and $x = 2$ respectively.

10. One of the factors of $P(x)$ is :
(A) $x+1$ **(B)** $x-2$ **(C)** $3x+1$ **(D)** None of these
11. If the polynomial $P(x)$ is divided by $(x+3)$, the remainder is :
(A) -32 **(B)** 100 **(C)** 32 **(D)** 0

12. If the difference of the roots of the equation $x^2 + px + q = 0$ be unity, then $(p^2 + 4q^2)$ is equal to :
- (A) $(1+2q)^2$ (B) $(1-2q)^2$ (C) $4(p-q)^2$ (D) $2(p-q)^2$
13. The set of values of 'a' for which both roots of the equation $x^2 + 2(a+1)x + (9a-5) = 0$ are negative is :
- (A) $[0, \infty)$ (B) $(-\infty, 6]$ (C) $(-\infty, 0]$ (D) $\left[\frac{5}{9}, 1\right] \cup [6, \infty)$
14. The set of all values of 'a' for which the quadratic equation $3x^2 + 2(a^2+1)x + (a^2-3a+2) = 0$ possesses roots of opposite sign, is :
- (A) $(-\infty, 1)$ (B) $(-\infty, 0)$ (C) $(1, 2)$ (D) $\left(\frac{3}{2}, 2\right)$
15. If at least one root of equation $x^2 - 2mx + m^2 - 1 = 0$ lie in the interval $(-2, 4)$, then complete values of m is given by:
- (A) $m \in (-3, 5)$ (B) $m \in (-3, -1) \cup (3, 5)$ (C) $m \in (-3, -1) \cup (-1, 3) \cup (3, 5)$ (D) $m \in [-3, 5]$
16. If $y = ax^2 + bx + c$ represents the curve given in the figure and $b^2 = 2(b+2ac)$, where $a \neq 0$ and $AP = 3$ units, then OP is equal to:
- (A) $\frac{3}{2}$ (B) $\frac{3}{4}$ (C) 3 (D) 6
17. If roots of the quadratic equation $x^2 - x \ln(a^2 - 3a + 2) + a^2 - 4 = 0$ are of opposite sign, then :
- (A) $a \in (-2, 2)$ (B) $a \in (-\infty, 1) \cup (2, \infty)$ (C) $a \in (-\infty, -2) \cup (2, \infty)$ (D) $a \in (-2, 1)$
18. If α, β are the roots of the equation $ax^2 + bx + c = 0$, then $\frac{\alpha}{a\beta+b} + \frac{\beta}{a\alpha+b}$ is equal to :
- (A) $\frac{2}{a}$ (B) $\frac{2}{b}$ (C) $\frac{2}{c}$ (D) $-\frac{2}{a}$
19. If x is real, then the value of $\frac{x+2}{2x^2+3x+6}$ lies in the interval.
- (A) $\left(\frac{1}{13}, \frac{1}{3}\right)$ (B) $\left(-\frac{1}{13}, \frac{1}{3}\right)$ (C) $\left(-\frac{1}{3}, \frac{1}{13}\right)$ (D) None of these
20. The least value of sum of the cubes of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ for $a \geq 2$, is :
- (A) 0 (B) 2 (C) 4 (D) 5
21. The number of real roots of $3^{2x^2-7x+7} = 9$ is :
- (A) 0 (B) 2 (C) 1 (D) 4



- 22.** If $(1-p)$ is a root of quadratic equation $x^2 + px + (1-p) = 0$, then its roots are :
(A) 0, 1 **(B)** -1, 1 **(C)** 0, -1 **(D)** -1, 2
- 23.** The number of the real solutions of the equation $x^2 - 3|x| + 2 = 0$ is :
(A) 2 **(B)** 4 **(C)** 1 **(D)** 3
- 24.** The sum of all the real values of x satisfying the equation $2^{(x-1)(x^2+5x-50)} = 1$ is:
(A) 16 **(B)** 14 **(C)** -4 **(D)** -5
- 25.** Let $p(x)$ be a quadratic polynomial such that $p(0) = 1$. If $p(x)$ leave remainder 4 when divided by $x-1$ and it leaves remainder 6 when divided by $x+1$; then:
(A) $p(2) = 11$ **(B)** $p(2) = 19$ **(C)** $p(-2) = 19$ **(D)** $p(-2) = 11$
- 26.** If equations $ax^2 + bx + c = 0$, $(a, b, c \in R, a \neq 0)$ and $2x^2 + 3x + 4 = 0$ have a common root, then $a : b : c$ equals:
(A) 1 : 2 : 3 **(B)** 2 : 3 : 4 **(C)** 4 : 3 : 2 **(D)** 3 : 2 : 1
- 27.** The sum of the roots of the equation, $x^2 + |2x-3| - 4 = 0$, is:
(A) 2 **(B)** -2 **(C)** $\sqrt{2}$ **(D)** $-\sqrt{2}$
- 28.** The equation $\sqrt{3x^2 + x + 5} = x - 3$, where x is real, has:
(A) no solution **(B)** exactly one solution
(C) exactly two solutions **(D)** exactly four solutions

Miscellaneous Question bank

Level - 2

29. If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers, then $b^2 - 4c$ equals :
 (A) 1 (B) 2 (C) 3 (D) 4
30. The maximum number of real roots of the equation $x^{2n} - 1 = 0$ is :
 (A) 2 (B) 3 (C) n (D) $2n$
31. If α, β are the roots of the equation $ax^2 + bx + c = 0$ then $\left(\frac{\alpha}{a\beta + b}\right)^3 - \left(\frac{\beta}{a\alpha + b}\right)^3$ is equal to:
 (A) 0 (B) 1 (C) $(a+b)^2$ (D) $(a-b)^2$
32. If α, β are real and $\alpha^2, -\beta^2$ are the roots of $a^2x^2 + x + 1 - a^2 = 0$ ($a > 1$) then β^2 is equal to:
 (A) a^2 (B) 1 (C) $1 - a^2$ (D) $1 + a^2$
33. If the roots of the quadratic equation $x^2 + px + q = 0$ are $\tan 30^\circ$ and $\tan 15^\circ$, then the value of $2 + q - p$ is :
 (A) 0 (B) 1 (C) 2 (D) 3
34. If the equation $(\cos p - 1)x^2 + x \cos p + \sin p = 0$ in the variable x , has real roots, then p can take any value in the interval :
 (A) $(0, 2\pi)$ (B) $(-\pi, 0)$ (C) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ (D) $(0, \pi)$
35. If a, b, c are in A.P. and if $(b - c)x^2 + (c - a)x + (a - b) = 0$ and $2(c + a)x^2 + (b + c)x = 0$ have a common root, then :
 (A) a^2, b^2, c^2 are in A.P. (B) a^2, c^2, b^2 are in A.P.
 (C) a^2, c^2, b^2 are in G.P. (D) None of these
36. The number of rational roots of $(2x + 3)(2x + 5)(x - 1)(x - 2) = 30$ is :
 (A) 4 (B) 3 (C) 2 (D) 5
37. If a, b, c are distinct real numbers, then the expression

$$f(x) = a^2 \frac{(x-b)(x-c)}{(a-b)(a-c)} + b^2 \frac{(x-c)(x-a)}{(b-c)(b-a)} + c^2 \frac{(x-a)(x-b)}{(c-a)(c-b)}$$
 is identically equal to :
 (A) $x^2 - (a+b+c)x + abc$ (B) $x^2 + x - abc$
 (C) x^2 (D) None of these
38. If $\frac{x-a}{x^2-3x+2}$ takes all real values for $x \in R$, then :
 (A) $a = 2$ (B) $a < 2$ (C) $1 < a < 2$ (D) $1 \leq a \leq 2$
39. Let $f(x)$ be a polynomial for which the remainders when divided by $x-1, x-2, x-3$ respectively are 3, 7, 13. Then the remainder of $f(x)$ when divided by $(x-1)(x-2)(x-3)$ is :
 (A) $f(x)$ (B) $x^2 + x + 1$ (C) $x^2 + 1$ (D) None of these

- 40.** If $x^2 + 4y^2 - 8x + 12 = 0$ is satisfied by real values of x and y then y must lie between :
(A) 2, 6 **(B)** 2, 5 **(C)** -1, 1 **(D)** -2, -1
- 41.** If $5^x + (2\sqrt{3})^{2x} \geq 13^x$ then the solution set for x is :
(A) $[2, +\infty)$ **(B)** $\{2\}$ **(C)** $(-\infty, 2]$ **(D)** $[0, 2]$
- 42.** If $x \in R$, then $\frac{2a(x-1)\sin^2 \alpha}{x^2 - \sin^2 \alpha}$ cannot lie between :
(A) $a \sin^2 \alpha, a \cos^2 \alpha$ **(B)** $a \sin^2\left(\frac{\alpha}{2}\right), a \cos^2\left(\frac{\alpha}{2}\right)$ 
(C) $2a \sin^2 \alpha, 2a \cos^2 \alpha$ **(D)** $2a \sin^2\left(\frac{\alpha}{2}\right), 2a \cos^2\left(\frac{\alpha}{2}\right)$
- 43.** If the equations $ax + by = 1, cx^2 + dy^2 = 1$ have only one solution then $\frac{a^2}{c} + \frac{b^2}{d}$ is equal to:
(A) 1 **(B)** -1 **(C)** 0 **(D)** 2
- 44.** If $0 < \alpha < \beta < \gamma < \frac{\pi}{2}$, then the equation $\frac{1}{x - \sin \alpha} + \frac{1}{x - \sin \beta} + \frac{1}{x - \sin \gamma} = 0$ has : 
(A) Imaginary roots **(B)** Real and equal roots
(C) Real and unequal roots **(D)** Rational roots
- 45.** 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 the roots of $x^n + 1 + (x+1)^n = 0$, then n is : 
(A) An odd integer **(B)** An even integer **(C)** Any integer **(D)** None of these
- 46.** The values of the parameter a for which the quadratic equations $(1-2a)x^2 - 6ax - 1 = 0$ and $ax^2 - x + 1 = 0$ have at least one root in common are :
(A) $0, \frac{1}{2}$ **(B)** $\frac{1}{2}, \frac{2}{9}$ **(C)** $\frac{2}{9}$ **(D)** $0, \frac{1}{2}, \frac{2}{9}$
- 47.** If p, q, r are positive and are in A.P., 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)** $\left| \frac{p}{r} - 7 \right| < 4\sqrt{3}$ **(C)** All p and r **(D)** No p and r
- *48.** If α, β are the roots of $x^2 + px + q = 0$ and α^4, β^4 are the roots of $x^2 - rx + s = 0$ then:
(A) $r = p^4 - 4p^2q + 2q^2$ **(B)** $r = 4p^2q - p^4 - 2q^2$
(C) $s = q^4$ **(D)** $r = p^4 - 4p^2q$
- 49.** $\sin A, \sin B, \cos A$ are in G.P. Roots of $x^2 + 2x \cot B + 1 = 0$ are always :
(A) Real **(B)** Imaginary **(C)** Greater than 1 **(D)** Equal

50. If a, b, c are the sides of a triangle ABC such that $a \neq b \neq c$ and $x^2 - 2(a + b + c)x + 3\lambda(ab + bc + ca) = 0$ has real roots, then greatest integral value of λ is: 
- (A) 1 (B) 2 (C) 0 (D) 3
51. If x be real, the expression $\frac{x^2 + 2x - 11}{x - 3}$ takes all real values except those which lie between a and b then a and b are :
- (A) -12, -4 (B) -12, 12 (C) 4, 12 (D) -4, 4
52. If $a + b + c = 0$ and $a^2 + b^2 + c^2 = 1$ then the value of $a^4 + b^4 + c^4$ is :
- (A) 1 (B) 4 (C) $\frac{1}{2}$ (D) $\frac{1}{4}$
53. If p and q are distinct reals, then $2\{(x - p)(x - q) + (p - x)(p - q) + (q - x)(q - p)\}$
 $= (p - q)^2 + (x - p)^2 + (x - q)^2$ is satisfied by :
- (A) No value of x (B) Exactly one value of x
 (C) Exactly two values of x (D) Infinite values of x

Paragraph for Q. 54 to 56

The coordinates of the vertex of the parabola $f(x) = 2x^2 + px + q$ are $(-3, 1)$, then :

54. The value of p is :
- (A) 12 (B) -12 (C) 19 (D) -19
55. The value of q is :
- (A) -19 (B) 19 (C) -12 (D) None of these
56. The parabola :
- (A) Touches the x -axis
 (B) Intersects the x -axis in two real and distinct points
 (C) Lies completely above the x -axis
 (D) Lies completely below the x -axis
57. The least integral value of ' m ' for which the expression $mx^2 - 4x + 3m + 1$ is positive for every $x \in R$ is :
- (A) 1 (B) -2 (C) -1 (D) 2
58. The least integral value of ' a ' for which the graphs $y = 2ax + 1$ and $y = (a - 6)x^2 - 2$ neither intersect nor touch each other is :
- (A) -6 (B) -5 (C) 3 (D) 2
59. Find the set of values of ' α ' for which the expression $y = \frac{\alpha x^2 + 6x - 8}{\alpha + 6x - 8x^2}$ has atleast one common linear factor in numerator and denominator : 
- (A) {14} (B) {2} (C) $\{-8, 2, 14\}$ (D) $\{0, 2, 14\}$

60. Solution set of the equation $3^{2x^2} - 2 \cdot 3^{x^2+x+6} + 3^{2(x+6)} = 0$ is :
(A) $\{-3, 2\}$ **(B)** $\{6, -1\}$ **(C)** $\{-2, 3\}$ **(D)** $\{1, -6\}$
61. If $\log_{10}(x^3 + y^3) - \log_{10}(x^2 + y^2 - xy) \leq 2$, then the maximum value of xy , for all $x \geq 0, y \geq 0$ is :
(A) 2500 **(B)** 3000 **(C)** 1200 **(D)** 3500
62. If every pair from among the equations $x^2 + px + qr = 0$, $x^2 + qx + rp = 0$ and $x^2 + rx + pq = 0$ has a common root, then the product of three common roots is :
(A) pqr **(B)** $2pqr$ **(C)** $p^2q^2r^2$ **(D)** None of these
63. If $a_1, a_2, a_3, \dots, a_n \in R$ then $(x - a_1)^2 + (x - a_2)^2 + \dots + (x - a_n)^2$ assumes its least value at x is equal to:
(A) $a_1 + a_2 + \dots + a_n$ **(B)** $2(a_1 + a_2 + a_3 + \dots + a_n)$
(C) $n(a_1 + a_2 + \dots + a_n)$ **(D)** None of these
- *64. The value of m for which one of the roots of $x^2 - 3x + 2m = 0$ is double of one of the roots of $x^2 - x + m = 0$ is :
(A) 0 **(B)** -2 **(C)** 2 **(D)** None of these
65. If α, β be the roots of the equation $(x - a)(x - b) + c = 0$ ($c \neq 0$), then the roots of the equation $(x - c - \alpha)(x - c - \beta) = c$ are :
(A) a and $b + c$ **(B)** $a + c$ and b **(C)** $a + c$ and $b + c$ **(D)** a and b
66. If the product of the roots of the equation $x^2 - 2\sqrt{2}kx + 2e^{2\log k} - 1 = 0$ is 31, then k is equal to :
(A) 1 **(B)** 2 **(C)** 3 **(D)** 4
67. If $x \in R$ then $\frac{x^2 + 2x + a}{x^2 + 4x + 3a}$ can take all values if : 
(A) $a \in (0, 2)$ **(B)** $a \in [0, 1]$ **(C)** $a \in [-1, 1]$ **(D)** None of these
68. If $f(x) = ax^2 + bx + c$, $g(x) = -ax^2 + bx + c$ where $ac \neq 0$, then $f(x)g(x) = 0$ has :
(A) at least three-real roots **(B)** no real solution
(C) at least two-real roots **(D)** two real roots and two imaginary roots
69. If α, β are roots of $x^2 + px - q = 0$ and γ, δ are roots of $x^2 + px + r = 0$, then the value of $(\alpha - \gamma)(\alpha - \delta)$ is:
(A) $p + q$ **(B)** $q - r$ **(C)** $r - q$ **(D)** $q + r$
- *70. If S is the set of all real x such that $\frac{2x - 1}{2x^3 + 3x^2 + x}$ is positive, then S contains :
(A) $\left(-\infty, -\frac{3}{2}\right)$ **(B)** $\left(-\frac{3}{2}, \frac{1}{4}\right)$ **(C)** $\left(-\frac{1}{4}, \frac{1}{2}\right)$ **(D)** $\left(\frac{1}{2}, 3\right)$

71. The number of positive real roots of $x^4 - 4x + 1 = 0$ is :
(A) 3 **(B)** 2 **(C)** 1 **(D)** 0
72. The number of negative real roots of $x^4 - 4x - 1 = 0$ is :
(A) 3 **(B)** 2 **(C)** 1 **(D)** 0
73. The number of complex roots of the equation $x^4 - 4x - 1 = 0$ is :
(A) 3 **(B)** 2 **(C)** 1 **(D)** 0
74. If $x^2 + x + 1$ is a factor of $ax^3 + bx^2 + cx + d$ then the real root of $ax^3 + bx^2 + cx + d = 0$ is :
(A) $-\frac{d}{a}$ **(B)** $\frac{d}{a}$ **(C)** $\frac{a}{d}$ **(D)** None of these
75. If α, β, γ are the roots of the cubic equation $x^3 - px^2 + qx - r = 0$, then the value of $\sum \alpha^2\beta$ is equal to:
(A) $pq + 3r$ **(B)** $pq + r$ **(C)** $pq - 3r$ **(D)** $\frac{q^2}{r}$
76. If α, β, γ are the roots of equation $x^3 - px^2 + qx - r = 0$, then the value of $\left(\frac{1}{\alpha^2} + \frac{1}{\beta^2} + \frac{1}{\gamma^2}\right)$ is :
(A) $\frac{p^2 - 2pr}{r^2}$ **(B)** $\frac{q^2 - 2pr}{r^2}$ **(C)** $\frac{r^2 - 2pq}{r^2}$ **(D)** None of these
77. Number of distinct real solutions of the equation $x^2 + \left(\frac{x}{x-1}\right)^2 = 8$ is :
(A) 3 **(B)** 4 **(C)** 6 **(D)** 0
78. If $mx^2 - 9mx + 5m + 1 > 0, \forall x \in R$, then m lies in the interval :
(A) $\left(-\frac{4}{61}, 0\right)$ **(B)** $\left[0, \frac{4}{61}\right)$ **(C)** $\left(\frac{4}{61}, \frac{61}{4}\right)$ **(D)** $\left(-\frac{61}{4}, 0\right)$
79. The number of real roots of the equation $x^4 + \sqrt{x^4 + 20} = 22$ is :
(A) 4 **(B)** 2 **(C)** 0 **(D)** 1
80. The number of positive integral roots of $x^4 + x^3 - 4x^2 + x + 1 = 0$ is :
(A) 0 **(B)** 1 **(C)** 2 **(D)** 4
81. The value of ' α ' for which the equations $x^3 + ax + 1 = 0$ and $x^4 + ax^2 + 1 = 0$ have a common root is :
(A) 2 **(B)** -2 **(C)** 0 **(D)** None of these
82. If t_n denotes the n^{th} term of an AP and $t_p = \frac{1}{q}$, and $t_q = \frac{1}{p}$, then which of the following is necessary a root of the equation $(p + 2q - 3r)x^2 + (q + 2r - 3p)x + (r + 2p - 3q) = 0$
(A) t_p **(B)** t_q **(C)** t_{pq} **(D)** t_{p+q}

- 83.** Let $\alpha, \beta, \gamma, \delta$ be the roots of $x^4 + x^2 + 1 = 0$. Then the equation whose roots are $\alpha^2, \beta^2, \gamma^2, \delta^2$ is :
- (A) $(x^2 - x + 1)^2 = 0$ (B) $(x^2 + x + 1)^2 = 0$
 (C) $x^4 - x^2 + 1 = 0$ (D) $x^2 + x + 1 = 0$
- 84.** If $p, q \in \{1, 2, 3, 4\}$, the number of equations of the form $px^2 + qx + 1 = 0$ having real roots are :
- (A) 15 (B) 9 (C) 7 (D) 8
- *85.** The roots of the equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ are :
- (A) $\frac{c - a}{b - c}, 1$ (B) $\frac{a - b}{b - c}, 1$
 (C) equal if $a, -b, c$ are in AP (D) equal if a, b, c are in AP
- 86.** The equation $\pi^x = -2x^2 + 6x - 9$ has :
- (A) no solution (B) one solution (C) two solutions (D) infinite solutions
- 87.** The values of ' a ' for which the expression $x^2 - (3a - 1)x + 2a^2 + 2a - 11$ is always positive are given by ;
- (A) $5 < a < 9$ (B) $a < 5$ (C) $a > 9$ (D) None of these
- 88.** If $ax^2 + 2bx + c = 0, a_1x^2 + 2b_1x + c_1 = 0$ have a common root, then the roots of the equation $(b^2 - ac)x^2 + (2bb_1 - ac_1 - a_1c)x + (b_1^2 - a_1c_1) = 0$ are :
- (A) Different (B) Equal (C) Zero (D) None of these
- 89.** Let α and β be the roots of equation $px^2 + qx + r = 0, p \neq 0$. If p, q and r are in AP and $\frac{1}{\alpha} + \frac{1}{\beta} = 4$, then the value of $|\alpha - \beta|$ is :
- (A) $\frac{\sqrt{61}}{9}$ (B) $\frac{2\sqrt{17}}{9}$ (C) $\frac{\sqrt{34}}{9}$ (D) $\frac{2\sqrt{13}}{9}$
- 90.** If the equations $x^2 + 2x + 3 = 0$ and $ax^2 + bx + c = 0; a, b, c \in R$, have a common root, then $a : b : c$ is equal to :
- (A) 1 : 2 : 3 (B) 3 : 2 : 1 (C) 1 : 3 : 2 (D) 3 : 1 : 2
- 91.** Sachin and Rahul attempted to solve a quadratic equation. Sachin made a mistake in writing down the constant term and ended up in roots (4, 3). Rahul made a mistake in writing down coefficient of x to get roots (3, 2). The correct roots of equation are :
- (A) -4, -3 (B) 6, 1 (C) 4, 3 (D) -6, -1
- 92.** If the difference between the roots of the equation $x^2 + ax + 1 = 0$ is less than $\sqrt{5}$, then the set of possible values of a is :
- (A) $(-3, 3)$ (B) $(-3, \infty)$ (C) $(3, \infty)$ (D) $(-\infty, -3)$
- *93.** If the roots of the quadratic equation $x^2 + px + q = 0$ are $\tan 22\frac{1}{2}^\circ$ and $\tan 15^\circ$, then:
- (A) $q - p = 3\sqrt{2} - \sqrt{6} - 1$ (B) $q - p = \sqrt{2} - \sqrt{6} - 1$
 (C) $\sqrt{3}p - q = 1 - 2\sqrt{2} - 2\sqrt{3}$ (D) $\sqrt{3}p - q = 5 - 2\sqrt{2} - 2\sqrt{3}$

94. All the values of m for which both roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ lie in $[2, 4]$ is given by:
(A) $m \in (1, 5)$ **(B)** $m \in \{3\}$ **(C)** $m \in [1, 5]$ **(D)** $m \in \phi$
95. 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) $[4, 5]$ **(B)** $(-\infty, 4)$ **(C)** $(6, \infty)$ **(D)** $(5, 6]$
96. If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, then the value of q is :
(A) $\frac{49}{4}$ **(B)** 12 **(C)** 3 **(D)** 4
97. 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)** $x^2 - 18x - 16 = 0$
98. If the sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is equal to the sum of the squares of their reciprocals, then $\frac{a}{c}, \frac{b}{a}$ and $\frac{c}{b}$ are in :
(A) arithmetic progression **(B)** geometric progression
(C) harmonic progression **(D)** arithmetic-geometric progression
99. The value of ' a ' for which one root of the quadratic equation $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ is twice as large as the other, is :
(A) $2/3$ **(B)** $-2/3$ **(C)** $1/3$ **(D)** $-1/3$
100. Let for $a \neq a_1 \neq 0$, $f(x) = ax^2 + bx + c$, $g(x) = a_1x^2 + b_1x + c_1$ and $p(x) = f(x) - g(x)$. If $p(x) = 0$ only for $x = -1$ and $p(-2) = 2$, then the value of $p(2)$ is : 
(A) 18 **(B)** 3 **(C)** 9 **(D)** 6
101. If $\frac{1}{\sqrt{a}}$ and $\frac{1}{\sqrt{\beta}}$ are the roots of the equation, $ax^2 + bx + 1 = 0 (a \neq 0, a, b \in R)$, then the equation $x(x + b^3) + (a^3 - 3abx) = 0$ has roots:
(A) $\alpha^{3/2}$ and $\beta^{3/2}$ **(B)** $\alpha\beta^{1/2}$ and $\alpha^{1/2}\beta$
(C) $\sqrt{\alpha\beta}$ and $\alpha\beta$ **(D)** $\alpha^{-3/2}$ and $\beta^{-3/2}$
102. If x is a solution of the equation, $\sqrt{2x+1} - \sqrt{2x-1} = 1, \left(x \geq \frac{1}{2}\right)$, then $\sqrt{4x^2 - 1}$ is equal to:
(A) $\frac{3}{4}$ **(B)** $\frac{1}{2}$ **(C)** 2 **(D)** $2\sqrt{2}$
103. The value of ' k ' so that equation $(x^2 - 2x)^2 - 3(x^2 - 2x) + k + 2 = 0$ has four real and distinct roots is :
(A) $\left(2, -\frac{1}{4}\right)$ **(B)** $\left(-6, \frac{1}{4}\right)$ **(C)** $(-6, -2)$ **(D)** Not possible 