IIT/EKLAVYA BATCH

THE GURUKUL INSTITUTE

PLOT 5C, 2ND FLOOR, GANAPATI COMPLEX, SEC-13, OPP. JAIPURIA SCHOOL, VASUNDHARA, GHAZIABAD (U.P)PH. NO.9810780903

DAILY PRACTICE PROBLEMS
QUADRATIC EQUATIONS

1. If $2^{x^2} : 2^{2x} = 8^k : 1$, then equation has only one solution if
   a) k =1/3 b) k = -1 /3 c) k> 1/3 d) k<-1/3
2. If α, β are roots of the quadratic equation $ax^2 + bx + c = 0$, the equation whose roots are α^2, β^2 is given by:
   a) $(ax + c)^2 = b^2x$ b) $(ax - c)^2 = b^2x$ c) $(ax-c)^2 + b^2x = 0$ d) None of these
3. The number of real roots of the equation $x^2 - x + 15x + 31 = 0$ is
   a) None b) one c) two d) more than 2
4. The number of real roots of the equation $x^2 - |x| - 6 = 0$ is
   a) One b) Two c) Three d) More than 2
5. If α, β are roots of the quadratic equation $ax^2 + bx + c = 0$ the equation whose roots are $\alpha + \frac{1}{\beta}$, $\beta + \frac{1}{\alpha}$ is given by
   a) $x^2 + (a + c)bx + (a + c)^2 = 0$ b) $acx^2 + (a + c)bx + (a + c)^2 = 0$
   c) $acx^2 + bx + (a + c)^2 = 0$ c) $acx^2 - (a + c)bx + (a + c)^2 = 0$
6. If (a, b) are the roots of the equation $(x + c)(x + d) = p$, the roots of the equation $(x - a)(x - b) + p = 0$
   a) c, d b) –c, - d c) p + c, p+d d) p-c, p – d
7. If α, β are roots of the equation $ax^2 + bx + c = 0$ such that $\beta < \alpha < 0$, then the quadratic eqution whose roots are $|\alpha|, |\beta|$ is given by
   a) $|a|x^2 + |b|x + |c| = 0$ c) $a|x|^2 + b|x| + c = 0$
   b) $ax^2 - |b|x + c = 0$ ` d) $|a|x^2 - |b|x + |c| = 0$
8. The sum of real roots of the equation $x^2 - 13x - 11 - 5 = 0$
   a) 0 b) $\frac{5-\sqrt{33}}{2}$ c) 1 d) None of these
9. If x = 3 + 2i, the value of $x^4 - 7x^3 + 20x^2 - 19x + 14$ is
   a) -1 b) 1 c) 4+ 2i d) None of these
10. If x = 4 + 3i (where $i = \sqrt{-1}$) then the value of $x^3 - 4x^2 - 7x + 12$ equals
    a) – 88 b) 48 + 36i c) – 256 + 12i d) None of these
11. In a triangle PQR, angle R= $\frac{\pi}{2}$. If $\tan(\frac{P}{2})$ and $\tan\left(\frac{Q}{2}\right)$ are roots of the equation $ax^2 + bx + c = 0$ ($a \neq 0$), then
    a) a + b = c b) b + c = a c) a + c = b d) b= c
12. If a, b ,c are the sides of a triangle obtuse angles at C, then the equation $(x - a)(x - b) + c^2 = 0$ has
    a) complex roots b) both +ve roots
    c) both – ve roots d) both roots are of opposite sign
13. The greatest integral value of 'm' for which the equation $(2m - 1)x^2 - 4x + (2m - 1) = 0$ has real roots is given by
    a) 0 b) 1 c) 2 d) none of these
14. If a + b+ c> 0 and a < 0 b< c then the roots of the equation
    $a(x - b)(x - c) + b(c - x)(x - a)(x - b) = 0$ are
    a) both positive b) both negative c) one positive and one negative d) complex
15. If a, b, c are the sides of a triangle obtuse angled at A, then both roots of the quadratic equation $(a - b)x^2 - 2cx + (a - b) = 0$ are

a) positive b) negative c) real d) complex

16. If a, b, c are positive real numbers that are in A.P , then both the roots of the equation $ax^2 + 2bx + c = 0$ are
a) complex b) real c) positive d) negative

17. Given the equation $(m + 2)x^2 + 2(m+1)x - (m - 1) = 0$ with $-4 < m < -3$, then both roots are
a) real b) positive c) negative d) complex

18. If a> b> c and $a^3 + b^3 + c^3 = 3abc$, then the quadratic Eq^n $ax^2 + bx + c = 0$ has roots which are
a) both real b) both +ve c) both –ve d) one +ve and one –ve

19. If $P(x) = ax^2 + bx + c$ and $Q(x) = -ax^2 + dx + c$, $ac \neq 0$ then $P(x)Q(x) = 0$
a) has two real roots
b) has atleast two real roots
c) either all roots are real or all are imaginary
d) None of these

20. The quadratic equation $(1 - \sin\theta)x^2 + 2(1 - \sin\theta)x - 3\sin\theta = 0$has both roots complex for all θ lying in the interval
a) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ b)$(0, \frac{3\pi}{2})$ c) $\left(\frac{\pi}{6}, \frac{7\pi}{6}\right)$ d)$\left(\frac{7\pi}{6}, \frac{11\pi}{6}\right)$

21. If m> 0, the quadratic equation $(1 + m)(1 + x - x^2) = (1 + x)(1 + m - m^2)$ has both roots which are
a) real b) positive c) negative d) of opposite sign

22. If k is an integer the equation $(k - 1)^2 x^2 - 2(k + 2)(k - 1)x + (6k + 7) = 0$ has complex roots for
a) no values of k b) one value of k c) two values of k d) more than two values of k

23. $(a^2 - 3a + 2)x^2 + (|a| - 1)x + a^2 - 4a + 3 = 0$ will have more than two roots if 'a' equals
a) 1 b) -1 c) 1, 2 d) 1, 3

24. If p, q are distinct rational numbers then the roots of equation
$(p + q)^2x^2 - 5(p^2 - q^2)x - 2(p - q)^2 = 0$ are
a) rational & unequal b) real &equal c) complex d) none of these

25. If a, b, c ∈Q, the roots of the equation $abc^2 x^2 + 3a^2cx + b^2cx - 6a^2 - ab + 2b^2 = 0$ re
a) Irrational b) rational c) real & equal d) complex

26. If $-\pi < \theta < \pi$, the equation $(\cos 3\theta + 1)x^2 + (2\cos 2\theta - 1)x + (1 - 2\cos\theta) = 0$ has more than two roots for
a) no values of θ b) one value of θ c) two value of θ d) none of these

27. Roots of the equation $x^2 - \sqrt{8x} - 14 = 0$ are
a) real, equal and rational
b) real, unequal and rational
c) real, unequal and irrational
d) complex number

28. Let f(x) = be a quadratic expression which is positive for real x. If $g(x) = f(x) + f'(x) + f''(x)$
a) $g(x) < 0$ b) $g(x) > 0$ c) $g(x) = 0$ d) $g(x) \geq 0$

29. Let a, b, c be real numbers $a \neq 0$. 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) $2\gamma = \alpha + \beta$ b) $\gamma - \alpha = \frac{\beta}{2}$ c) $\gamma = \alpha$ d) $\alpha < \gamma < \beta$

30. If α & β(α<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) $\alpha < 0$, $|\alpha| < \beta$

31. If the equation $ax^2 + bx - 4 = 0$ doesn't have two distinct real roots, then the greatest value of $2a + b$ is
a) 4 b) -4 c) 2 d) -2

32. If the difference of the roots of the equation $x^2 + ax +| b = 0$ is equal to the difference of the roots of the equation $x^2 + bx + a = 0$ ($a \neq b$); a+ b is equal to
a) 4 b) -4 c) 2 d) -2

33. If a ∈R, number of distinct real solutions of $x^2 - |x| + a = 0$ cannot be
a) 3 b) 1 c) 2 d) 4

34. Number of real solutions of $\frac{(x+b)(x+c)}{(b-a)(c-a)} + \frac{(x+c)(x+a)}{(c-b)(a-b)} + \frac{(x+a)(x+b)}{(a-c)(b-c)} = 1$ is (a, b, c ∈R)
a) 0 b) 1 c) 2 d)-2

35. No. of positive integral n for which the equation $\frac{x-8}{n-10} = \frac{n}{x}$ has no solution is
a) 5 b) 6 c) 7 d) 8

36. The values of m for which harmonic mean of the roots of the quadratic equation $(m-1)x^2 - 2m^2x + (m+1) = 0$ is equal to 2 are given by

a) 1/2 , 1   b) -1/ 2, 1   c) 1/ 2 , -1   d) none of these

37. The greatest integral value of m for which the equation $(2m - 3)x^2 - 4x + (2m - 3) = 0$ has both negative roots is given by

a) 1   b) 2   c) 3   d) None of these

38. The set of values of 'a' for which both the roots of the quadratic equation

a) $(4, \infty)$ b) $(2, \infty)$ c) $(4/3, 0)$ d) None of these

39. The quadratic equation $(m-2)x^2 + 2(3m - 2)x - (m + 2) = 0$ has roots of the same sign for 'm' satisfying

a) $-2 < m < 2$ b) $6/5 < m < 2$ c) $-2 < m < 0$ or $6/5 < m < 2$ d) $0 < m < 2$

40. If $\boldsymbol{\lambda}$ be an integer and α, β be roots of $4x^2 - 16x + \boldsymbol{\lambda} = 0$ such that $1 < \alpha < 2$ and $2 < \beta < 3$, then possible values of $\boldsymbol{\lambda}$ are

a) { 60, 64}   b) { 61, 62, 63}   c) {49, 50, ….,62, 63}   d) None of these

41. The set of $\boldsymbol{\lambda}$ for which one root of equation $x^2 + (2\boldsymbol{\lambda} - 4)x - \boldsymbol{\lambda}^2 = 0$ is less than 4 and other greater than 4 is given by……..

a) $0 < \boldsymbol{\lambda} < 8$ b) $-8 < \boldsymbol{\lambda} < 0$ c) $\boldsymbol{\lambda} < 0$ or $\boldsymbol{\lambda} > 8$ d) None of these

42. The set of all real 'a' for which the roots of the equation $x^2 - 2|a+1|x + 1 = 0$ are real is given by

a) $-2 < a < 0$ b) $a < -2$ or $a > 0$ c) $0 < a < 2$ d) None of these

43. The set of all p for which $(p - 2)x^2 + 2(p + 1)x + p + 4 < 3$ for all real x is given by

a) $(-\infty, 2)$ b) $(-1, 2)$ c) $(-\infty, -1)$ d) $(-\infty, -2)$

44. The set of 'm' for which the roots of the equation $(m^2 - m + 1)x^2 + 2(m+1)x + (m^2 + m - 2) = 0$ are of opposite sign is given by

a) $-1 < m < 2$ b) $-2 < m < 1$ c) $m \in R$ d) No value of m

45. The values of 'a' for which $ax^2 + 2(2 - a)x + 2a - 7 > 0$ for all x are given by

a) $a < -1$ or $a > 4$ b) $a < 0$ or $a > 4$ c) $a < -1$ d) $a > 4$

46. The values of m for which the equation $mx^2 + (2m - 1)x + m - 1 = 0$ has roots of opposite sign are given by

a) Never   b) for all value of m   c) $-1 < m < 0$ d) $0 < m < 1$

47. The values of k for which $k(x^2 + x) + 3k + x$ is greater than -3 for all real x are given by

a) $-1 < k < 1/11$ b) $-1 < k < 0$ c) $0 < k < 1/11$ d) $k > 1/11$

48. The values of 'm' for which the equation $(m + 3)x^2 + (2m - 5)x + (m - 7) = 0$ has real roots of the same sign are given by

a) $7 < m < 109/4$ b) $m < -3$ or $m > 7$ c) $-3 < m < 109/4$ d) None of these

49. The values of 'a' for which both the roots of the equation $(a - 6)x^2 = a(x - 3)$ are positive are given by

a) $(0, 6)$ b) $(0, \frac{72}{11})$ c) $(6, \frac{72}{11})$ d) $(\frac{72}{13}, 6)$

50. The set of values of p for which both the roots of the equation $x^2 + 4px + p + 5 = 0$ are less than one is given by

a) $(-1/2, \infty)$ b) $(\frac{-6}{5}, \frac{5}{4})$ c) $\frac{5}{4}, \infty)$ d) $(-\frac{6}{5}, -1) \cup \left(\frac{5}{4}, \infty\right)$

51. The set values of a for which the inequality $x^2 + ax + a^2 + 6a < 0$ is satisfied for all $x \in (1, 2)$ lies in the interval

a) $\frac{-7-\sqrt{45}}{2} \le a \le \frac{-7+\sqrt{45}}{2}$ b) $-4 - 2\sqrt{3} \le a \le -4 + 2\sqrt{3}$

c) $\frac{-7-\sqrt{45}}{2} \le a \le -4 + 2\sqrt{3}$ d) $-4 - 2\sqrt{3} \le a \le \frac{-7+\sqrt{45}}{2}$

52. The values of 'a' for which the equation $(1 - a^2)x^2 + 2ax - 1 = 0$ has roots belonging to (0, 1) are given by

a) $\frac{-1+\sqrt{5}}{2} < a < \frac{1+\sqrt{5}}{2}$ b) $\frac{1+\sqrt{5}}{2} < a < 2$

c) a< 2 d) a> 2

53. The equations $kx^2 + x + k = 0$ and $kx^2 + kx + 1 = 0$ have exactly one root in common for
a) $k = -\frac{1}{2}, 2$ b) k = 1 c) $k = -\frac{1}{2}$ d) $k = \frac{1}{2}$

54. If the equations $x^2 - 5x + a = 0$ and $x^2 + x - 2a = 0$ have only one root in common, then their other roots are roots of the quadratic equation
a) 2 b) – 2 c) k = - 1/2 d) k = 1/ 2

55. If the equation $ax^2 + 2bx + c = 0$ and $ax^2 + 2cx + b = 0$, $(a \neq 0, b \neq c)$ have a common root, then their other roots are roots of the quadratic equation
a) $a^2x^2 - 2a(b + c)x + 4bc = 0$ b) $a^2x(x + 1) + 4bc = 0$
c) $a^2x(x - 1) + 4bc = 0$ d) None of these

56. If one roots of the $x^2 - px + 12 = 0$ is even prime while $x^2 + px + q = 0$ has equal roots, then q is
a) 4 b) 8 c) 12 d) 16

57. The values of λ for which one root of the equation $x^2 + (1 - 2\lambda)x + (\lambda^2 - \lambda - 2) = 0$ is greater than 3 and other smaller than 2 are given by
a) $2 < \lambda < 5$ b) $1 < \lambda < 4$ c) $1 < \lambda < 5$ d) None of these

58. The value of a for which the equation $x^3 + ax + 1 = 0$ and $x^4 + ax^2 + 1 = 0$ have a common root is
a) 2 b) – 2 c) 1 d) – 1

59. If a, b, c ∈ R and equations $ax^2 + bx + c = 0$ and $x^2 + 3x + 4 = 0$ have a common root then $\frac{a+c}{b}$ is equal to
a) 1 b) 5/3 c) 3/ 4 d) Cannot determine

60. The equations $ax^2 + bx + a = 0$, $x^3 - 2x^2 + 2x - 1 = 0$ have two roots in common. Then a + b equals
a) at least one root in (- 1 , 0) b) at least one root in (0, 1)
b) both imaginary roots d) one root in (-1 , 0) & other in (1, 2)

61. If $x^2 - x - 2 = 0$, is a factor of $x^4 - px^2 - q$, then (p + q) equals
a) 6 b) 12 c) 8 d) cannot determined

62. If the equations $ax^2 + bx + a = 0$, $x^3 - 2x^3 + 2x - 1 = 0$ have two roots in common. Then a+ b equals
a) 1 b) – 1 c) 0 d) None of these

63. If a + b+ c = 0 , then the quadratic equation $3ax^2 + 2bx + c = 0$ has
a) at least one root in (- 1 , 0) b) at least one root in (0, 1)
c) both imaginary roots d) one root in (- 1, 0) & other in (1 , 2)

64. If α, β, γ are nonzero roots of the equation $ax^3 + bx^2 + cx + d = 0$, then the equation whose roots are $-\alpha, -\beta, -\gamma$ is
a) $ax^3 + bx^2 - cx - d = 0$ b) $ax^3 + cx^2 + bx + d = 0$
c) $dx^3 + bx^2 + cx + a = 0$ d) $ax^3 - bx^2 + cx - d = 0$

65. If α, β, γ are the roots of the equation $x^3 + 3x - 7 = 0$, then the equation whose roots are $2\alpha + 1$, $2\beta + 1$, $2\gamma + 1$ are
a) $x^3 - 3x^2 + 15x - 69 = 0$ b) $ax^3 + cx^2 + bx + d = 0$
c) $dx^3 + bx^2 + cx + a = 0$ d) $ax^3 - bx^2 + cx - d = 0$

66. If α, β, γ are non zero roots of the equation $x^3 + ax^2 + bx + 1 = 0$ then the equation whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}, \frac{1}{\gamma}$ is
a) $ax^3 + x^2 + bx + c = 0$ b) $x^3 + bx^2 + ax + 1 = 0$
c) $x^3 - bx^2 + ax - 1 = 0$ d) None of these

67. $x^3 + ax^2 - bx - 4 = 0$ has
a) at least one –ve root b) at least one positive
b) one + ve & one – ve root d) all real roots

68. The number of real solutions of the equation $\sqrt{x-1}(x^2 - 3x - 28 = 0)$ is

a) 3 b) 2 c) 1 d) 0

69. $\sqrt{x-a}(x^2-1)=0$ has two real solutions if
a) a> - 1 b) a > 1 c) a< - 1 d) a< 1

70. The number of integral solutions of the inequality x + $\sqrt{x}-6\ \leq 0$ is
a) 3 b) 4 c) 5 d) None of these

71. The solution set of the inequality $(x^2 - x - 2)(x^2 + 5x + 4) \geq 0$ given by
a) $[-\infty, -4]$ b) [- 4, 2] c) $[-\infty, 2) \cup [4, \infty]$ d) None of these

72. $\frac{x+3}{x^2-x-2} \geq \frac{1}{4}$ for all x satisfying
a) – 2 < x < 1 or x > 4 b) – 1 < x < 2 or x > 4
c) x < - 1 or 2 < x < 4 d) None of these

73. The set of all x satisfying $3^{2x} - 3^x - 6 > 0$ is given by
a) 0 < x < 1 b) x > 1 c) $x > 3^{-2}$ d) None of these

74. The inequality (x – 1)ln (2 – x)< 0 holds if x satisfies
a) 1 < x < 2 b) x > 0 c) 0 < x < 1 d) None of these

75. If x is real, the expression $\frac{x^2-3}{2x+4}$
a) has all real values b) lie between – 3 and – 1
c) has all real values except – 3 and – 1 d) lies between 1 & 3

76. If x is real, the expression $\frac{2x^2-3x+2}{2x^2+3x+2}$
a) lies between -1/7 and 7 b) lies between 1/7 and 7
c) does not lie between -1/7 and 7 d) does not lie between 1/7 and 7

77. If $-3 < \frac{x^2-ax-2}{x^2+x+1} < 2$ for all x ∈R, then a satisfies
a) – 6 < a< 7 b) – 1 < a<2 c) – 2 < a < 1 d) – 7 < a < 6

78. If x is real , the minimum and maximum value of $\frac{x^2-4x+2}{x^2+2x+2}$ are respectively
a) $\{4-\sqrt{14}, 4+\sqrt{14}\}$ b) $\{4-3\sqrt{2}, 4+3\sqrt{2}\}$
c) { - 2, 6} d) None of these

79. For real values of x, the value of expression $\frac{11x^2-12x-6}{x^2+4x+2}$ are respectively
a) lies between – 17 and – 3 b) does not lie between – 17 and – 3
c) lies between 3 and 17 d) None of these

80. If $(2x + 1)^2 - |2x + 11 - 6| < 0$, then
a) – 1 < x< 2 b) – 2 <x < 1 c) - 2 < x< - 1 d) 1 < x < 2

81. (x + 2a)(x+ a – 4)< 0 for – 1 ≤x ≤1, then ‘a’ satisfies
a) 1/ 2 < a < 3 b) -1/2 < a <1/ 2 c) – 3 < a < - 1/ 2 d) None of these

82. The values of m for which the inequality $\frac{x^2-mx-2}{x^2+mx+4} > -1$ is satisfied for all real x are given by
a) m = 0 b) -2 < m< 2 c) – 4 < m < 4 d) None of these

83. The curve $y = (a+1)x^2 + 2$ intersects the curve y = ax + 3 in exactly one point if a equals
a) { - 2 } b) { 2 } c) { - 2 , 2} d) { 4}

84. The expression $x^2 + kxy + y^2 + 2y + 1$ can be resolved into two linear factors for
a) no value of k b) one value of k c) two values of k d) more than 2 values of k

85. The values of k for which the expression $x^2 + 2xy + ky^2 + 2x + k = 0$ can be reslved into linear factors is given by
a) { 0, 2} b) { 0} c) { 0, - 2 } d) { 2}

86. If $(x^2 - 4|x| + 4)(x^2 - 4|x| + 3) < 0$ then x lies in the interval
a) $(-3, -1)$ b) (1, 3) c) (2 , - 1) d) either (a) or (b)

87. The solution set of $\left|\frac{x}{x-1}\right| + |x| = \frac{x^2}{x-1}$ is
a) [1, ∞) b) (- 1, ∞) c) (1, ∞) d) None of these

88. Number of real solutions of $x^2 + \frac{1}{x-2} = 4 + \frac{1}{x-2}$ is

a) 0 b) 1 c) 2 d) More than 2

89. If f(x, y, z) = $4x^2 + 4y^2 + z^2 - 16x - 4y - 2z$ then
a) maximum value of f(x, y, z) = 18
b) minimum value of f(x, y, z) = 18
c) maximum value of f(x, y, z) = $-$ 18
d) minimum value of f(x, y, z) = $-$ 18

90. If $x^2 + y^2 + z^2$ a, then value of xy + yz + zx lies in the interval
a) [-a, a] b) $\left[\frac{-a}{2}, \frac{a}{2}\right]$ c) $\left[\frac{-a}{2}, a\right]$ d) $\left[-a, \frac{a}{2}\right]$

In the following (91 t0 114) one or more than one alternative may be correct

91. $2x^2 - \cos\theta(3 + 4x) + 2 > 0$ for all real x provided θ lies in the interval
a) $\left(0, \frac{\pi}{3}\right)$ b) $\left(\frac{\pi}{3}, \frac{2\pi}{3}\right)$ c) $\left(\frac{2\pi}{3}, \frac{4\pi}{3}\right)$ d) $\left(\frac{4\pi}{3}, 2\pi\right)$

92. If a, b, c are real distinct numbers such that $a^3 + b^3 + c^3 = 3abc$ then the quadratic equation $ax^2 + bx + c = 0$ has
a) real roots
b) at least one negative root
c) at least one (+)ve root
d) complex root

93. If a, b, c are natural numbers and the roots of the equation $ax^2 + bx + c = 0$ are consecutive odd integer then
a) b is divisible by 4
b) c is divisible by 3
c) D is perfect square
d) b, c, D are divisible by a

94. If a+ 3b + 9c = 0, ac< 0 and one root of the equation $ax^2 + bx + c = 0$ is square of the other, then
a) a and b have same sign
b) b and c have opposite sign
c) both roots are rational
d) a, b, c are irrational

95. If a, b, c denote the sides of a triangle then both the roots of the quadratic equation $cx^2 + 2(a - b)x + c = 0$ are
a) real b) positive c) negative d) complex

96. A quadratic equation whose difference of roots is 3 and the sum of the squares of the roots I s29 is given by
a) $x^2 + 9x + 14 = 0$ b) $x^2 + 7x + 10 = 0$ c) $x^2 - 7x - 10 = 0$ d) $x^2 - 7x + 10 = 0$

97. The equation $\sqrt{2}\, sin^2 x \pm \left(2\sqrt{2} - 1\right) \sin x - 2 = 0$ has two roots in the interval
a) (0 , π) b) (π, 2π) c) $\left(\frac{3\pi}{2}, \frac{5\pi}{2}\right)$ d) $\left(\frac{-\pi}{2}, \frac{3\pi}{4}\right)$

98. If the equation $ax^2 - 2bx + c = 0$ has real roots which are reciprocal of each other, then
a) a = c b) b ≤a c) $|b| \geq |a|$ d) $|b| \geq |a|$

99. If the quadratic equation $ax^2 - 2bcx + c = 0$ has both roots positive then
a) a and b must have same sign
b) a and c must have sign
c) b and c must have same sign
d) a and D must have sign

100. The quadratic equation $x^2 + 2(k-4)x + 2k = 0$ has both roots negative for all k lying in the interval
a) $(-\infty, 2)$ b) (2, 4) c) (0, 4) d) (8, ∞)

101. The quadratic expression $ax^2 + bx + c > 0$ for all real x if and only if
a) a> 0 , D > 0 b) a> c, D > 0 c) c> 0, D< 0 d) a+c > b, D < 0

102. Let a, b, c ∈R. If $ax^2 + bx + c = 0$ has two real roots A and B where A < - 1 and B > 1 then
a) $1 + \left|\frac{b}{a}\right| + \frac{c}{a} < 0$ b) $1 - \left|\frac{b}{a}\right| + \frac{c}{a} < 0$ c) $|c| < |a|$ d) $|c| < |a| - |b|$

103. If the quadratic expression $y = ax^2 + bx + c$ has negative minimum value for a negative x then one must have
a) a > 0 b) b> 0 c) c> 0 d) D> 0

104. If for the quadratic equation $ax^2 + bx + c = 0$ the product of the roots is equal to the sum of the reciprocals of the roots then
a) a and b are of opposite sign
b) a and c are of opposite sign

c) both roots cannot be negative
d) – a, c , b are in G.P

105. The curves $y = a^2 x^2 + 2x - 4$ and $y = 4x^2 - ax - a^2$ intersect in more than two points for
a) No value of a
b) one value of 'a'
c) two values of 'a'
d) more than two values of 'd'

106. If the equation $ax^2 - 2bx + c = 0$ has real roots which are reciprocal of each other then one has
a) $b \leq a$
b) $|b| \geq |a|$
c) $|b| \geq |c|$
d) $a = c$

107. If the quadratic equation $ax^2 - 2bx + c = 0$ has both roots negative then
a) a and c must have opposite sign
b) b and c must have opposite sign
c) a and D must have opposite sign
d) c and D must have opposite sign

108. The set of all 'm' for which $mx^2 - 4x + m < 0$ for all real x is given by
a) $m > 2$
b) $m > -2$
c) $-2 < m < 2$
d) None

109. If a, b, c are distinct negative numbers that are in H.P. then
a) the equation $ax^2 - 2bx + c = 0$ has distinct real roots
b) the equation $ax^2 + 2bx + c = 0$ has atleast one (-)ve root
c) $ax^2 - 2bx + c < 0$ for all real x
d) $ax^2 - 2bx + c > 0$ for all real x

110. If the equation $x^2 + px + q = 0$ has rational roots where p and q are positive integers, then both the roots of the given equation are
a) positive integers
b) negative integers
c) one (+)ve and one (-)ve integer
d) None of these

111. If a, b, c are distinct numbers in A.P. then both the roots of the quadratic equation
a) real
b) positive
c) negative
d) rational

112. If the roots $ax^2 + 2bx + c = 0$ $(a \neq 0)$ are non real complex and $a + c < 2b$ then
a) $c > 0$
b) $c < 0$
c) $4a + c < 4b$
d) $4a + c > 4b$

113. If $b^2 \geq 4ac$ for the equation $ax^4 + bx^2 + c = 0$, then all roots of the equation will be real if
a) $b > 0, a > 0, c > 0$
b) $b < 0, a > 0, c > 0$
c) $b > 0, a > 0, c < 0$
d) $b > 0, a < 0, c < 0$

114. $5^x + (2\sqrt{3})^{2x} - 169 \leq 0$ is true in the interval
a) $(-\infty, 2)$
b) $(0, 2)$
c) $(2, \infty)$
d) $(0, 4)$