**Equation, Inequation and Expression**

**Choose the most appropriate option (a, b, c or d).**

Q 1. If x is a real number such that x(x2 + 1), (-1/2)x2, 6 are three consecutive terms of an AP then the next two consecutive term of the AP are

(a) 14, 6 (b) -2, -10 (c) 14, 22 (d) none of these

Q 2. The number of real solutions of is

(a) 0 (b) 1 (c) 2 (d) infinite

Q 3. The number of values of a for which

(a2 – 3a + 2)x2 + (a2 – 5a + 6)x + a2 + a2 – 4 = 0

is an identity in x if

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

Q 4. The number of values of the pair (a, b) for which

a(x + 1)2 + b(x2 – 3x – 2) + x + 1 = 0

is an identity in x is

(a) 0 (b) 1 (c) 2 (d) infinite

Q 5. The number of values of the triplet (a, b, c) for which

a cos2x + b sin2 x + c = 0

is satisfied by all real x is

(a) 0 (b) 2 (c) 3 (d) infinite

Q 6. The polynomial (ax2 + bx + c)(ax2 – dx – c), ac ≠ 0, has

(a) four real zeros (b) at least two real zeros

(c) at most two real zeros (d) no real zeros

Q 7. Let f(x) = ax3 + 5x2 – bx + 1. If f(x) when divided by 2x + 1 leaves 5 as remainder, and f'(x) is divisible by 3x – 1 then

(a) a = 26, b = 10 (b) a = 24, b = 12 (c) a = 26, b = 12 (d) none of these

Q 8. is divisible by x + y if

(a) n is any integer ≥ 0 (b) n is an odd positive integer

(c) n is an even positive integer (d) n is a rational number

Q 9. If x, y are rational numbers such that

x + y + (x – 2y) = 2x – y + (x – y – 1) 

then

(a) x and y cannot be determined (b) x = 2, y = 1

(c) x = 5, y = 1 (d) none of these

Q 10. The number of real solutions of the equation

2x/2 + (+ 1)x = (5 + )x/2

is

(a) one (b) two (c) four (d) infinite

Q 11. The number of real solutions of the equation ex = x is

(a) 1 (b) 2 (c) 0 (d) none of these

Q 12. The sum of the real roots of the equation x2 + |x| - 6 = 0 is

(a) 4 (b) 0 (c) -1 (d) none of these

Q 13. The solutions of the equation 2x – 2[x] = 1, where [x] = the greatest integer less than or equal to x, are

(a) n ∈N (b) , n ∈ N (c) ,  (d) 

Q 14. The number of real solutions of the equation sin (ex) = 5x + 5-x is

(a) 0 (b) 1 (c) 2 (d) infinitely many

Q 15. The number of real solution of 1 + |ex – 1| = ex(ex – 2) is

(a) 0 (b) 1 (c) 2 (d) 4

Q 16. The equation has

(a) one real solution (b) no real solution

(c) infinitely many real solutions (d) none of these

Q 17. If y ≠ 0 then the number of values of the pair (x, y) such that

, is

(a) 1 (b) 2 (c) 0 (d) none of these

Q 18. The number of real solutions of the equation log0.5 x = |x| is

(a) 1 (b) 2 (c) 0 (d) none of these

Q 19. The equation has

(a) no solution (b) one solution (c) two solutions (d) more than two solutions

Q 20. The number of solutions of the equation |x| = cos x is

(a) one (b) two (c) three (d) zero

Q 21. The product of all the solutions of the equation

(x – 2)2 – 3 |x – 2| + 2 = 0

is

(a) 2 (b) -4 (c) 0 (d) none of these

Q 22. If 0 < x < 1000 and x, where [x] is the greatest integer less than or equal to x, the number of possible values of x is

(a) 34 (b) 32 (c) 33 (d) none of these

Q 23. The solution set of (x)2 + (x + 1)2= 25, where (x) is the least integer greater than or equal to x, is

(a) (2, 4) (b) (-5, -4] ∪ (2, 3] (c) [-4, -3) ∪ [3, 4) (d) none of these

Q 24. If 3x+1 = then x is

(a) 3 (b) 2 (c) log32 (d) log2 3

Q 25. If then the number of values of x is

(a) 2 (b) 4 (c) 1 (d) none of these

Q 26. The number of real solutions of the equation is

(a) two (b) one (c) zero (d) none of these

Q 27. The number of real solutions of

 is

(a) one (b) two (c) three (d) none of these

Q 28. If [x] = the greatest integer less than or equal to x, and (x) = the least integer greatest than or equal to x, and [x]2 + (x)2 > 25 then x belongs to

(a) [3, 4] (b) (-∞, -4] (c) [4, +∞) (d) (-∞, -4] ∪ [4, +∞)

Q 29. Let R = the set of real numbers,  = the set of integers, N = the set of natural numbers. If S be the solution set of the equation (x)2 + [x]2 = (x – 1)2 + [x + 1]2, where (x) = the least integer greater than or equal to x and [x] = the greatest integer less than or equal to x, then

(a) S = R (b) S = R -  (c) S = R – N (d) none of these

Q 30. If [x]2= [x + 2], where [x] = the greatest integer less than or equal to x, then x must be such that

(a) x = 2, - 1 (b) x ∈ [2, 3) (c) x ∈ [-1, 0) (d) none of these

Q 31. The solution set of + |x + 1| = is

(a) {x | x ≥ 0} (b) {x | x > 0} ∪ {-1} (c) {-1, 1} (d) {x | x ≥ 1 or x ≤ -1}

Q 32. The number of solutions of |[x] – 2x| = 4, where [x] is the greatest integer ≤ x, is

(a) 2 (b) 4 (c) 1 (d) infinite

Q 33. The set of real values of x satisfying |x – 1| ≤ 3 and |x – 1| ≥ 1 is

(a) [2, 4] (b) (-∞, 2] ∪ [4, +∞) (c) [-2, 0] ∪ [2, 4] (d) none of these

Q 34. The set of real values of x satisfying is

(a) [-1, 3] (b) [0, 2] (c) [-1, 1] (d) none of these

Q 35. If x ∈  (the set of integers) such that x2 – 3x < 4 then the number of possible values of x is

(a) 3 (b) 4 (c) 6 (d) none of these

Q 36. If x is an integer satisfying x2 – 6x + 5 ≤ 0 and x2 – 2x > 0 then the number of possible values of x is

(a) 3 (b) 4 (c) 2 (d) infinite

Q 37. The solution set of the inequation log1/3(x2 + x + 1) + 1 > 0 is

(a) (-∞, -2) ∪ (1, +∞) (b) [-1, 2] (c) (-2, 1) (d) (-∞, +∞)

Q 38. If 5x + ≥ 13x then the solution set for x is

(a) [2, +∞) (b) {2} (c) (-∞, 2] (d) [0, 2]

Q 39. If 3x/2 + 2x > 25 then the solution set is

(a) R (b) (2, +∞) (c) (4, +∞) (d) none of these

Q 40. If sinx α + cosx α ≥ 1, 0 < α < , then

(a) x ∈ [2, +∞) (b) x ∈ (-∞, 2) (c) x ∈ [-1, 1] (d) none of these

Q 41. The solution set of x2 + 2 ≤ 3x ≤ 2x2 – 5 is

(a) φ (b) [1, 2] (c) (-∞, -1] ∪ [5/2, +∞) (d) none of these

Q 42. The solution set of > 1, x ∈ R, is

(a) (3, +∞) (b) (-1, 1) ∪ (3, +∞) (c) [-1, 1] ∪ [3, +∞) (d) none of these

Q 43. The number of integral solutions of is

(a) 4 (b) 5 (c) 3 (d) none of these

Q 44. If a, b, c are nonzero, unequal rational numbers then the roots of the equation abc2x2 + (3a2 + b2)cx – 6a2 – ab + 2b2 = 0 are

(a) rational (b) imaginary (c) irrational (d) none of these

Q 45. If l, m are real and l ≠ m then the roots of the equation

(l – m)x2 – 5(l + m)x – 2(l – m) = 0 are

(a) real and equal (b) nonreal complex (c) real and unequal (d) none of these

Q 46. If a, b, c, d are four consecutive terms of an increasing AP then the roots of the equation (x – a)(x – c) + 2(x – b)(x – d) = 0 are

(a) real and distinct (b) nonreal complex (c) real and equal (d) integers

Q 47. If a, b, c are three distinct positive real number then the number of real roots of ax2 + 2b |x| - c = 0 is

(a) 4 (b) 2 (c) 0 (d) none of these

Q 48. The equation x2 – 6x + 8 + λ(x2 – 4x + 3) = 0, λ ∈ R, has

(a) real and unequal roots for all λ (b) real roots for λ < 0 only

(c) real roots for λ > 0 only (d) real and unequal roots for λ = 0 only

Q 49. If cos θ, sin φ, sin θ are in GP then roots of x2 + 2 cot φ . x + 1 = 0 are always

(a) equal (b) real (c) imaginary (d) greater than 1

Q 50. The roots of ax2 + bx + c = 0, where a ≠ 0 and coefficients are real, are nonreal complex and a + c < b. Then

(a) 4a + c > 2b (b) 4a + c < 2b (c) 4a + c = 2b (d) none of these

Q 51. The equation (a + 2)x2 + (a – 3)x = 2a – 1, a ≠ -2 has roots rational for

(a) all rational values of except a = -2 (b) all real values of a except a = -2

(c) rational values of a > (d) none of these

Q 52. If a . 3tanx + a . 3-tanx – 2 = 0 has real solutions, , 0 ≤ x ≤ π, then the set of possible values of the parameter a is

(a) [-1, 1] (b) [-1, 0) (c) (0, 1] (d) (0, +∞)

Q 53. If a > 1, roots of the equation (1 – a)x2 + 3ax – 1 = 0 are

(a) one positive and one negative (b) both negative

(c) both positive (d) both nonreal complex

Q 54. If a ∈ R, b ∈ R then the equation x2 – abx – a2 = 0 has

(a) one positive root and one negative root (b) both roots positive

(c) both roots negative (d) nonreal roots

Q 55. If the roots of the equation x2 – 2ax + a2 + a – 3 = 0 are less than 3 then

(a) a < 2 (b) 2 ≤ a ≤ 3 (c) 3 < a ≤ 4 (d) a > 4

Q 56. If α, β are the roots of x2 – 3x + a = 0, a ∈ R and α < 1 < β then

(a) a ∈ (-∞, 2) (b) a ∈  (c) a ∈  (d) none of these

Q 57. If α, β be the roots of 4x2 – 16x + λ = 0, λ ∈ R such that 1 < α < 2 and 2 < β < 3 then the number of integral solutions of λ is

(a) 5 (b) 6 (c) 2 (d) 3

Q 58. The number of integer values of a for which x2 – (a – 1)x + 3 = 0 has both roots positive and x2 + 3x + 6 – a = 0 has both roots negative is

(a) 0 (b) 1 (c) 2 (d) infinite

Q 59. If X denotes the set of real numbers p for which the equation x2 = p(x + p) has its roots greater than p then X is equal to

(a)  (b)  (c) null set φ (d) (-∞, 0)

Q 60. If cos4 x + sin2 x – p = 0, p ∈ R has real solutions then

(a) p ≤ 1 (b) ≤ p ≤ 1 (c) p ≥  (d) none of these

Q 61. If one root of the equation (k2 + 1)x2 + 13x + 4k = 0 is reciprocal of the other then k has the value

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

Q 62. If the ratio of the roots of λx2 + μx + ν= 0 is equal to the ratio of the roots of x2 + x + 1 = 0 then λ, μ, ν are in

(a) AP (b) GP (c) HP (d) none of these

Q 63. p, q, r and s are integers. If the AM of the roots of x2 – px + q2 = 0 and GM of the roots of x2 – rx + s2 = 0 are equal then

(a) q is an odd integer (b) r is an even integer (c) p is an even integer (d) s is an odd integer

Q 64. If α, β are roots of the equation (x – a)(x – b) = c, c ≠ 0, then the roots of the equation (x - α)(x - β) + c = 0 are

(a) a, c (b) b, c (c) a, b (d) a + c, b + c

Q 65. If the roots of 4x2 + 5k = (5 + 1)x differ by unity then the negative value of k is

(a) -3 (b)  (c)  (d) none of these

Q 66. The harmonic mean of the roots of the equation

is

(a) 2 (b) 4 (c) 6 (d) 8

Q 67. If the product of the roots of the equation x2 – 5x + = 0 is 8 then λ is

(a)  (b)  (c) 3 (d) none of these

Q 68. If the roots of a1x2 + b1x + c1 = 0 are α1, β1, and those of

a2x2 + b2x + c2= 0 are α2, β2 such that α1α2 = β1β2 = 1

then

(a)  (b)  (c) a1a2 = b1b2 = c1c2 (d) none of these

Q 69. If α, β are the roots of ax2 + c = bx then the equation (a + cy)2 = b2y in y has the roots

(a) α-1, β-1 (b) α2, β2 (c) αβ-1, α-1β (d) α-2, β-2

Q 70. If the roots of ax2 – bx – c = 0 change by the same quantity then the expression in a, b, c that does not change is

(a)  (b)  (c)  (d) none of these

Q 71. If α, β are the roots of x2- px + q = 0 then the product of the roots of the quadratic equation whose roots are α2 - β2 and α3 - β3 is

(a) p(p2 – q)2 (b) p(p2 – q)(p2 – 4q) (c) p(p2 – 4q)(p2 + q) (d) none of these

Q 72. If the sum of the roots of the quadratic equation ax2 + bx + c = 0 is equal to the sum of the squares of their reciprocals then is equal to

(a) 2 (b) -2 (c) 1 (d) -1

Q 73. If the absolute value of the difference of roots of the equation x2 + px + 1 = 0 exceed then

(a) p < -1 or p > 4 (b) p > 4 (c) -1 < p < 4 (d) 0 ≤ p < 4

Q 74. If α, β are roots of x2 + px + q = 0 and γ, δ are the roots of x2 + px – r = 0 then (α - γ)(α - δ) is equal to

(a) q + r (b) q – r (c) –(q + r) (d) –(p + q + r)

Q 75. If α, β are roots of 375x2 – 25x – 2 = 0 and sn = αn + βn then is

(a)  (b)  (c)  (d) none of these

Q 76. The quadratic equation whose roots are the AM and HM of the roots of the equation x2 + 7x – 1 = 0 is

(a) 14x2 + 14x – 45 = 0 (b) 45x2 – 14x + 14 = 0

(c) 14x2 + 45x – 14 = 0 (d) none of these

Q 77. Let α ≠ β and α2 + 3 = 5α while β2 = 5β - 3. The quadratic equation whose roots areis

(a) 3x2 – 31x + 3 = 0 (b) 3x2 – 19x + 3 = 0 (c) 3x2 + 19x + 3 = 0 (d) none of these

Q 78. If a and b are rational and b is not a perfect square then the quadratic equation with rational coefficients whose one root is is

(a) x2- 2ax + (a2 – b) = 0 (b) (a2 – b)x2 – 2ax + 1 = 0

(c) (a2 − b)x2 – 2bx + 1 = 0 (d) none of these

Q 79. If is a root of ax2 + bx + 1 = 0, where a, b are real, then

(a) a = 25, b = -8 (b) a = 25, b = 8 (c) a = 5, b = 4 (d) none of these

Q 80. If α, β, γ be the roots of the equation x(1 + x2) + x2(6 + x) + 2 = 0 then the value of α-1 + β-1 + γ-1 is

(a) -3 (b)  (c)  (d) none of these

Q 81. If the roots of x3 – 12x2 + 39x – 28 = 0 are in AP then their common difference is

(a)  (b)  (c)  (d) 

Q 82. The roots of the equation x3 + 14x2- 84x – 216 = 0 are in

(a) AP (b) GP (c) HP (d) none of these

Q 83. If z0 = α + iβ, = , then the roots of the cubic equation

x3 – 2(1 + α)x2 + (4α + α2 + β2)x – 2(α2 + β2) = 0 are

(a)  (b) 1, z0, -z0 (c)  (d) 

Q 84. If 3 and 1 + are two roots of a cubic equation with rational coefficients then the equation is

(a) x2 – 5x2 + 9x – 9 = 0 (b) x3 – 3x2 – 4x + 12 = 0 (c) x3 – 5x2 + 7x + 3 = 0 (d) none of these

Q 85. Let a, b, c be real numbers and a ≠ 0. If α is a root of a2x2 + bx + c = 0, β is a root of a2x2 – bx – c = 0, and 0 < α < β then the equation a2x2 + 2bx + 2c = 0 has a root γ that always satisfies

(a)  (b)  (c) γ = α (d) α < γ < β

Q 86. Let a, b, c three real number such that 2a + 3b + 6c = 0. Then the quadratic equation ax2 + bx + c = 0 has

(a) imaginary roots (b) at least one root in (0, 1)

(c) at least one root in (-1, 0) (d) both roots in (1, 2)

Q 87. If the equations 2x2 – 7x + 1 = 0 and ax2 + bx + 2 = 0 have a common root then

(a) a = 2, b = -7 (b)  (c) a = 4, b = -14 (d) none of these

Q 88. The quadratic equations x2 + (a2 – 2)x – 2a2 = 0 and x2 – 3x + 2 = 0 have

(a) no common root for all a ∈ R (b) exactly one common root for all a ∈ R

(c) two common roots for some a ∈ R (d) none of these

Q 89. If the equation ax2 + bx + c = 0 and cx2 + bx + a = 0, a ≠ c have a negative common root then the value of a – b + c is

(a) 0 (b) 2 (c) 1 (d) none of these

Q 90. If the equations x2 + ix + a = 0, x2 – 2x + ia = 0, a ≠ 0 have a common root then

(a) a is real (b)  (c)  (d) the other root is also common

Q 91. If x2 – 2r . prx + r = 0; r = 1, 2, 3 are three quadratic equations of which each pair has exactly one root common then the number of solutions of the triplet (p1, p2, p3) is

(a) 2 (b) 1 (c) 9 (d) 27

Q 92. If (λ2 + λ - 2)x2 + (λ + 2)x < 1 for all x ∈ R then λ belongs to the interval

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

Q 93. The least integral value of k for which (k – 2)x2 + 8x + k + 4 > 0 for all x ∈ R, is

(a) 5 (b) 4 (c) 3 (d) none of these

Q 94. The set of possible values of x such that 5x + ()2x – 169 is always positive is

(a) [3, +∞) (b) [2, +∞) (c) (2, +∞) (d) none of these

Q 95. If all real values of x obtained from the equation

4x – (a – 3)2x + a – 4 = 0

are nonpositive then

(a) a ∈ (4, 5] (b) a ∈ (0, 4) (c) a ∈ (4, +∞) (d) none of these

Q 96. The set of possible values of λ for which

x2 – (λ2 - 5λ + 5)x + (2λ2 - 3λ - 4) = 0

has roots whose sum and product are both less than 1 is

(a)  (b) (1, 4) (c)  (d) 

Q 97. If log10 x + log10y ≥ 2 then the smallest possible value of x + y is

(a) 10 (b) 30 (c) 20 (d) none of these

Q 98. If for every real number x then the minimum value of f

(a) does not exist because f is unbounded (b) is not attained even though f is bounded

(c) is equal to 1 (d) is equal to -1

Q 99. If ax2 + bx + 6 = 0 does not have two distinct real roots, where a ∈ R, b ∈ R, then the least value of 3a + b is

(a) 4 (b) -1 (c) 1 (d) -2

Q 100. If ab = 2a + 3b, a > 0, b > 0 then the minimum value of ab is

(a) 12 (b) 24 (c)  (d) none of these

Q 101. If x2 + px + 1 is a factor of the expression ax3 + bx + c then

(a) a2 + c2 = -ab (b) a2 – c2 = -ab (c) a2 – c2 = ab (d) none of these

Q 102. If x2 – 1 is a factor of x4 + ax3 + 3x – b then

(a) a = 3, b = -1 (b) a = -3, b = 1 (c) a = 3, b = 1 (d) none of these

Q 103. The number of values of k for which

{x2 – (k – 2)x + k2}{x2 + kx + (2k – 1)}

is a perfect square is

(a) 1 (b) 2 (c) 0 (d) none of these

Q 104. If x+ λy – 2 and x - μy + 1 are factors of the expression

6x2 – xy – y2 – 6x + 8y – 12

then

(a)  (b)  (c)  (d) none of these

Q 105. If x – y and y – 2x are two factors of the expression

x3 – 3x2y + λxy2 + μy3

then

(a) λ = 11, μ = -3 (b) λ = 3, μ = -11 (c)  (d) none of these

Q 106. If x + y and y + 3x are two factors of the expression

λx3 - μx2y + xy2 + y3

then the third factor is

(a) y + 3x (b) y – 3x (c) y – x (d) none of these

Q 107. If x, y, z are real and distinct then

f(x, y) = x2 + 4y2 + 9z2 – 6yz – 3zx – 2xy

is always

(a) non-negative (b) nonpositive (c) zero (d) none of these

Q 108. If x2 + y2 + z2 = 1 then the value of xy + yz + zx lies in the interval

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

Q 109. If a ∈ R, b ∈ R then the factors of the expression a(x2 – y2) – bxy are

(a) real and different (b) real and identical (c) complex (d) none of these

Q 110. If a, b, c are in HP then the expresson

a(b – c)x2 + b(c – a)x + c(a – b)

(a) has real and distinct factors (b) is a perfect square

(c) has no real factor (d) none of these

Q 111. The number of positive integral values of k for which (16x2 + 12x + 39) + k(9x2 – 2x + 11)

is a perfect square is

(a) two (b) zero (c) one (d) none of these

Q 112. If (x – 1)3 is a factor of x4 + ax3 + bx2 + cx – 1 then the other factor is

(a) x – 3 (b) x + 1 (c) x + 2 (d) none of these

**Choose the correct options. One or more options may be correct.**

Q 113. If x2 – bx + c = 0 has equal integral roots then

(a) b and c are integers (b) b and c are even integers

(c) b is an even integer and c is a perfect square of a positive integer

(d) none of these

Q 114. Let A, G and H be the AM, GM and HM of two positive numbers a and b. The quadratic equatin whose roots are A and H is

(a) Ax2 – (A2 + G2)x + AG2 = 0 (b) Ax2 – (A2 + H2)x + AH2= 0

(c) Hx2 – (H2 + G2)x + HG2 = 0 (d) none of these

Q 115. Let A, G and H are the AM, GM and HM respectively of two unequal positive integers. Then the equation Ax2 - |G|x – H = 0 has

(a) both roots as fractions (b) at least one root which is a negative fraction

(c) exactly one positive root (d) at least one root which is an integer

Q 116. Let x2 – px + q = 0, where p ∈ R, q ∈ R, have the roots α, β such that α + 2β = 0 then

(a) 2p2 + q = 0 (b) 2q2 + p = 0 (c) q < 0 (d) none of these

Q 117. The cubic equation whose roots are the AM, GM and HM of the roots of x2 – 2px + q2 = 0 is

(a) (x – p)(x – q)(x – p – q) = 0 (b) (x – p)(x - |q|)(px – q2) = 0

(c)  (d) none of these

Q 118. If x2 + ax + b = 0 and x2 + bx + a = 0, a ≠ b, have a common root α then

(a) a + b = 1 (b) α + 1 = 0 (c) α = 1 (d) a + b + 1 = 0

Q 119. The line y + 14 = 0 cuts the curve whose equation is x(x2 + x + 1) + y = 0 at

(a) three real points (b) one real point (c) at least one real point (d) no real point

Q 120. If a, b, c are in GP, where a, c are positive, then the equation ax2 + bc + c = 0 has

(a) real roots (b) imaginary roots

(c) ratio of roots = 1 : w where w is a nonreal cube root of unity

(d) ratio of roots = b : ac

Q 121. If α, β are the roots of the equation x2 + x + 3 = 0 then the equation 3x2 + 5x + 3 = 0 has a root

(a)  (b)  (c)  (d) none of these

Q 122. If α, β are the roots of x2 – 2ax + b2 = 0 and γ, δ are the roots of x2 – 2bx + a2 = 0 then

(a) AM of α, β = GM of γ, δ (b) GM of α, β = AM of γ, δ

(c) α, β, γ, δ are in AP (d) α, β, γ, δ are in GP

Q 123. If the roots of the equation ax2 – 4x + a2 = 0 are imaginary and the sum of the roots is equal to their product then a is

(a) -2 (b) 4 (c) 2 (d) none of these

Q 124. If x, y, z are three consecutive terms of a GP, where x > 0 and the common ratio is r, then the inequality z + 3x > 4y holds for

(a) r ∈ (-∞, 1) (b)  (c) r ∈ (3, +∞) (d) 

Q 125. The equation ||x – 1| + a| = 4 can have real solutions for x if a belongs to the interval

(a) (-∞, 4] (b) (-∞, -4] (c) (4, +∞) (d) [-4, 4]

Q 126. The equation |x + 1| |x – 1| = a2- 2a – 3 can have real solutions for x if a belongs to

(a) (-∞, -1] ∪ [3, +∞) (b) [1 - , 1 + ]

(c) [1-, -1] ∪ [3, 1 + ] (d) none of these

Q 127. The common roots of the equations x3 + 2x2 + 2x + 1 = 0 and 1 + x130 + x1988 = 0 are (where ω is a nonreal cube root of unity)

(a) ω (b) ω2 (c) -1 (d) ω - ω2

Q 128. If α is a root of the equation 2x(2x + 1) = 1 then the other root is

(a) 3α3 - 4α (b) -2α(α + 1) (c) 4α3 - 3α (d) none of these

Q 129. For the equation 2x2 + x + 1 = 0

(a) roots are rational (b) if one root is p+then the other is –p+

(c) roots are irrational (d) if one root is P+ then the other is p-

Q 130. If α, β are the real roots of x2 + px + q = 0 and α4, β4 are the roots of x2 – rx + s = 0 then the equation x2 – 4qx + 2q2 – r = 0 has always

(a) two real roots (b) two negative roots

(c) two positive roots (d) one positive root and one negative root

Q 131. The equation has

(a) at least one negative solution (b) exactly ne irrational solution

(c) exactly three real solutions (d) two nonreal complex roots

Q 132. If a, b, c are rational and no two of them are equal then the equations

(b – c)x2 + (c – a)x + a – b = 0

and a(b – c)x2 + b(c – a)x + c(a – b) = 0

(a) have rational roots (b) will be such that at least one has rational roots

(c) have exactly one root common (d) have at least one root common

Q 133. The equations x2 + b2 = 1 – 2bx and x2 + a2 = 1 – 2ax have one and only one root common. Then

(a) a – b = 2 (b) a – b + 2 = 0 (c) |a – b| = 2 (d) none of these

Q 134. If px2 + qx + r = 0 has no real roots and p, q, r are real such that p + r > 0 then

(a) p – q + r < 0 (b) p – q + r > 0 (c) p + r = 0 (d) all of these

Q 135. Let p and q be roots of the equation x2 – 2x + A = 0, and let r and s be the roots of the equation x2 – 18x + B = 0. If p < q < r < s are in arithmetic progression then

(a) A = -83, B = -3 (b) A = -3, B = 77 (c) q = 3, r = 7 (d) p + q + r + s = 20

Q 136. The quadratic equation x2 – 2x - λ = 0, λ ≠ 0

(a) cannot have a real root if λ < -1

(b) can have a rational root if λ is a perfect square

(c) cannot have an integral root if n2 – 1 < λ < n2 + 2n where n = 0, 1, 2, 3, …..

(d) none of these

Q 137. A quadratic equation whose roots are , where α, β, γ are the roots of x3 + 27 = 0, is

(a) x2 – x + 1 = 0 (b) x2 + 3x + 9 = 0 (c) x2 + x + 1 = 0 (d) x2 – 3x + 9 = 0

Q 138. The graph of the curve x2 = 3x – y – 2 is

(a) between the lines x = 1 and  (b) between the lines x = 1 and x = 2

(c) strictly below the line 4y = 1 (d) none of these

Q 139. a(x2 – y2) + λ{x(y + 1) + 1} can be resolved into linear rational factors. Then

(a) λ = 1 (b)  (c) λ = 0, a = 1 (d) none of these

Q 140. x2 – 4 is a factor of f(x) = (a1x2 + b1x + c1). (a2x2 + b2x + c2) if

(a) b1 = 0, c1 + 4a1 = 0 (b) b2 = 0, c2 + 4a2 = 0

(c) 4a1 + 2b1 + c1 = 0, 4a2 + c2 = 2b2 (d) 4a1 + c1 = 2b1, 4a2 + 2b2 + c2 = 0

Q 141. ax2 + by2 + cz2 + 2ayz + 2bzx + 2cxy can be resolved into liner factors if a, b, c are such that

(a) a = b = c (b) ab + bc + ca = 1 (c) a + b + c = 0 (d) none of these

Q 142. If a, b are the real roots of x2 + px + 1 = 0 and c, d are the real roots of x2 + qx + 1 = 0 then (a – c)(b – c)(a + b)(b + d) is divisible by

(a) a + b + c + d (b) a + b – c – d (c) a – b + c – d (d) a – b – c – d

Q 143. If x ∈ [2, 4] then for the expression x2 – 6x + 5

(a) the least value = -4 (b) the greatest value = 4

(c) the least value = 3 (d) the greatest value = -4

Q 144. If 0 < a < 5, 0 < b < 5 and is satisfied for at least one real x then the greatest value of a + b is

(a) π (b)  (c) 3π (d) 4π

Q 145. Let f(x) = x2(x + 2) + x + 3. Then

(a) f(-3 –k) < 0 and f(-2 + k) > 0 for all k > 0 (b) f(-3 – k) > 0 and f(-2 + k) < 0 for all k > 0

(c) f(x) = 0 has a root α such that [α] + 3 = 0, where [α] is the greatest integer less than or equal to α

(d) f(x) = 0 has exactly one root α such that (α) + 2 = 0, where (α) is the smallest integer greater than or equal to α

1c 2a 3c 4a 5d 6b 7c 8a 9b 10a

11c 12b 13c 14a 15b 16b 17b 18a 19a 20b

21c 22c 23b 24d 25c 26b 27a 28d 29b 30d

31b 32b 33c 34a 35b 36a 37c 38c 39c 40b

41a 42b 43c 44a 45c 46a 47b 48a 49b 50b

51a 52c 53c 54a 55a 56a 57d 58b 59c 60b

61b 62b 63c 64c 65b 66b 67b 68b 69d 70c

71b 72a 73b 74c 75b 76c 77b 78b 79a 80c

81c 82b 83a 84d 85d 86b 87c 88b 89a 90c

91a 92b 93a 94c 95a 96d 97c 98d 99d 100b

101c 102b 103a 104a 105c 106b 107a 108c 109a 110b

111c 112b 113ac 114ac 115bc 116ac 117bc 118cd 119b 120bc

121ab 122ab 123c 124abcd 125ab 126ac 127ab 128bc 129bc 130ad

131bc 132ac 133abc 134b 135bcd 136ac 137c 138c 139bc 140abcd

141ac 142ab 143ad 144c 145acd