1. Find the least value of 'n' such that $(n-2)x^2 + 8x + n + 4 > 0$, $\forall\, x \in R$, where $n \in R$.

   (a) 4 (b) 5 (c) 3 (d) 6

2. If m and n are the roots of the equation $(a-2)x^2 - (5-a)x - 5 = 0$, then find the value of a if $|m-n| = 2\sqrt{6}$

   (a)3 (b) 4 (c) 2 (d) None of these

3. If the coefficient of x in a quadratic equation is zero, then the roots are equal in magnitude but opposite in sign.

   (a) False (b) True

   (c) Cannot be determined (d) None of these

4. Find the minimum value of $2-3x-4x^2$.

   (a) 35/16 (b) 41/16 (c) 38/16 (d) 2

5. Find the values of x for which the inequality $\frac{8x^2 + 16x - 51}{(2x-3)(x+4)} > 3$?

   (a) $(-\infty, -4) \cup (-3, \frac{3}{2}) \cup (\frac{5}{2}, \infty)$ (b) $(-\infty, -4) \cup (\frac{3}{2}, \infty)$

   (c) (-4,-3) U (3,6) (d) (-4,-3) U (6, ∞)

6. Solve the inequality $\frac{x-1}{x^2-4x+3} < 1$

   (a) $(-\infty, 1) \cup (1, 3) \cup (4, \infty)$ (b) $(-\infty, 1) \cup (0, 3) \cup (4, \infty)$

   (c) $(-\infty, 1) \cup (3, \infty)$ (d) $(-\infty, 1) \cup (2, 3) \cup (4, \infty)$

7. If $x^2 - 4x + \log_{0.5} a = 0$ does not have two distinct real roots, then the maximum value of a is

   (a) ¼ (b) 1/16 (c) -1/4 (d) -1/16

8. The complete set of values of x satisfying $\log_2 (x^2 + 1) > 0$ is

   (a) (1, ∞) (b) (-1,2) U – {0}

   (c) (-1,1) – {0} (d) (-1,0) U (1, ∞)

9. If $\frac{x^2-bx}{ax-c} = \frac{k-1}{k+1}$ has roots which are numerically equal but of opposite signs, then k is –

   (a) $\frac{a-b}{a+b}$ (b) $\frac{a+b}{a-b}$ (c) c (d) 1/c

10. The roots α and β of the quadratic equation $ax^2 + bx + c = 0$, are real and of opposite sign. Then the roots of the equation $\alpha(x - \beta)^2 + \beta(x - \alpha)^2 = 0$ are –

    (a) Positive (b) negative

    (c) real and of opposite sign (d) Imaginary

11. The integral value of a for which $ax^2 + ax + a = 2x^2 - 3x - 6$ has equal roots is –

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

12. If α, β, γ are the roots of the $x^3 - px - q = 0$, then the value of $(2\ \alpha + \beta + \gamma)(\alpha + 2\beta + \gamma)(\alpha + \beta + 2\gamma)$ is –

(a)q (b) –p (c) p (d) –p

13. The roots of the equation $4x^3 + 16x^2 - 9x - 36 = 0$, given that the sum of two of its roots is zero is-

(a) 3,-3,-1 (b) -4, -3/2, 3/2

(c) 4, 3/2, -3/2 (d) 1, -1, -9

13. The number of quadratic equations having the squared values of its roots also, as roots , is-
(a) Two (b) Four (c)Six (d) None
14. The expression $-a^2x^2 + bx - c$ is negative for all x if
(a) $b^2 > 4a^2c$ (b) $b^2 < 4a^2c$
(b) $b^2 = 4a^2c$ (d) $4b^2 < a^2c$
15. The greatest positive integral value of x for which $200 - x(10 + x)$ is positive, is –
(a) 11 (b) 9 (c) 10 (d) 19
16. The number of real solutions of $x - \frac{1}{x^2-4} = 2 - \frac{1}{x^2-4}$ is
(a) 0 (b) 1 (c) 2 (d) Infinite
17. If $4x^2 + kx + 3 \geq 0$, for all x, then $k \in$
(a) $(-4\sqrt{3}, 4\sqrt{3})$ (b) $[-4\sqrt{3}, 4\sqrt{3}]$ (c) (-3/4, 3/4) (d) [-3/4,3/4]
18. Solve the quadratic equation $(6-x)^4 + (8-x)^4 = 16$.
(a) 6, 8 (b) -6,-8 (c) -6,8 (d) 6,-8
19. If $x^2 - 4x + \log_{0.5} a = 0$, does not have two distinct real roots, then the maximum value of a is
(a) ¼ (b) 1/16 (c) -1/4 (d) None
20. The values of p for which $(p^2-1)x^2 + 2(p-1)x + 2 = 0$ is positive for any x, are
(a) $p \geq 1$ (b) p > -3 only (c) p< -3 or $p \geq 1$ (d) $p \leq 1$ only
21. If $\frac{x-1}{4x+5} < \frac{x-3}{4x-3}$, then x =
(a) [-5/4,3/4] (b) (-5/4,3/4) (c) (-5/4, 5/4) (d) (-3/4, 3/4)
22. The number of real roots of the equation $(x-3)^{1/2}(x^2 - 5x + 4) = 0$ is
(a) One (b) Two (c) Three (d) Four
23. The equation $(1+m)x^2 - 2(1+3m)x + (1+8m) = 0$ has equal roots if m =
(a) 0 (b) 3 (c) 1 (d) -3
24. The number of solutions of $x - \frac{\sin\beta}{x-1} = 1 - \frac{\sin\beta}{x-1}$ is –
(a) 1 (b) 2 (c) 0 (d) None
25. If $(\log_a x) / (\log_{ab} x)$ is equal to
(a) $1 + \log_a b$ (b) $1 + \log_b a$ (c) $1 - \log_a b$ (d) $1 - \log_b a$
26. $\log_4 \log_3 \log_2 x = 0$, then the value of x is
(a) 6 (b) 8 (c) 12 (d) None
27. If $\log_{0.09}(x-2) > \log_{0.3}(x-2)$, then x lies in the interval
(a) $(3, \infty)$ (b) (2,3) (c) (-1,0) (d) -1/2
28. The number of solution(s) for the equation $2\log_x a + \log_{ax} a + 3\log_{a.a.x} a = 0$ is

(a) One (b) Two (c) Three (d) Four

29. If the equation $x^2 + ax - a^2 - 1 = 0$ has roots of opposite signs, then determine a –

(a) $x \in R$ (b) $x \in [-1,1]$ (c) $x \in \emptyset$ (d) None

30. If the inequality $(mx^2+3x+4)/(x^2+2x+2) < 5$, is satisfied for all $x \in R$, then

(a) $1<m<5$ (b) $-1<m<5$ (c) $1<m<6$ (d) $m < 71/24$

31. Solve for x : $\log_{x.x}(x+1) > 0$

(a) $(1,\infty)$ (b) $(-1,2) \sim \{0\}$ (c) $(-1,1) - \{0\}$ (d) $(-1,0) \cup (1, \infty)$

32. Sum of the real roots of the equations $x^2 + 5|x| + 6 = 0$

(a) Equal to 5 (b) equal to 10 (c) equal to -5 (d) does not exist

33. Solve for x, $|x^2 - x - 6| = |x-2|$:

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

34. Find the roots of the equation $2^x + 2^{-x} = 2\cos^2(\frac{x}{6})$.

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

35. Find the roots of the equation $4^x + 6^x = 2.9^x$?

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

36. The sum of real roots of the equation $x^2 + (\frac{x}{x+1})^2 = 3$ is

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

37. The number of real roots of the equation $x^2 + (\frac{x}{x-1})^2 = 8$ is

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

38. The root of the equation $|x-1| + (x^2 - 1)^{1/4} + |x^2 - 3x + 2| = 0$ is

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

39. Find the solutions of $x + \sqrt{-x} = 1$

(a) No solution (b) 1 (c)0 (d) none of these

40. Solve the equation for x : $3x^4 - 2x^3 + 4x^2 - 4x + 12 = 0$

(a) No real roots (b) +4,-4 (c) +2, -2 (d) none of these

41. Solve the equation for x : $2x^4 - 11x^3 + 19x^2 - 11x + 2 = 0$

(a) +1,-1 (b) 0 (c) No real roots (d) +3, -3

42. How many real roots of the equation $(x-6)^4 + (x-8)^4 = 16$ are possible?

(a) Two (b) One (c) Zero (d) Four

43. How many real roots of the equation $(x+3)^4 + (x+5)^4 = 16$ are possible?