Topic: Quadratic Equation

Sub: Mathematics **Assignment: 4** Prof. Chetan Sir

1. The value of p and $q(p \neq 0, q \neq 0)$ for which p, q are the roots of the equation $x^2 + px + q = 0$ are:

(A) $p = 1$, $q = 2$ (B) $p = -1$, $q = 2$ (C) $p = -1$, $q = -2$ (D) $p = 1$, $q = -2$

2. If the roots of the equation $\frac{a}{x-a} + \frac{b}{x-b} = 1$ are equal in magnitude and opposite in sign, then:

(A) $a - b = 0$ (B) $a + b = 1$ (C) $a - b = 1$ (D) $a + b = 0$

3. If $a \in R$ and $a_1, a_2, a_3, \ldots, a_n \in R$ then $(x - a_1)^2 + (x - a_2)^2 + \cdots + (x - a_n)^2$ assumes its least value at $x =$:

(A) $a_1 + a_2 + \cdots + a_n$ (B) $2(a_1 + a_2 + \cdots + a_n)$
(C) $n(a_1 + a_2 + \cdots + a_n)$ (D) none of these

4. Number of values of k for which roots of equation $x^2 - 3x + k = 0$ lie in the interval (0, 1) is:

(A) only one (B) no value
(C) finite but more than one (D) $k \leq \frac{9}{4}$

5. If the roots of the equation $2x^2 - (a^3 + 1)x + (a^2 - 2a) = 0$ are of opposite signs, then the set of possible value of a is:

(A) (0,2) (B) [0,2] (C) (0,2] (D) [0,2)

6. The value of a for which the equations $x^2 - 3x + a = 0$ and $x^2 + ax - 3 = 0$ have a common root is:

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

7. The value of a for which one root of the equation $x^2 - (a + 1)x + a^2 + a - 8 = 0$ exceeds 2 and other is less than 2, are given by:

(A) $3 < a < 10$ (B) $a \geq 10$ (C) $-2 < a < 3$ (D) $a \leq -2$

8. If x be real and $y = \frac{x^2+6x+1}{2x}$ then which of the following is true:

(A) $2 < y < 4$ (B) $\frac{5}{2} < y < \frac{7}{2}$
(C) either $y \leq 2$ or $y \geq 4$ (D) none of these

9. Number of real solutions of the equation $(12x - 1)(6x - 1)(4x - 1)(3x - 1) = 5$ are:

(A) 0 (B) 2 (C) 1 (D) 4

10. If α, β are the roots of $ax^2 - 2bx + c = 0$, then $\alpha^3\beta^3 + \alpha^2\beta^3 + \alpha^3\beta^2$ is:

(A) $\frac{c^2(c+2b)}{a^3}$ (B) $\frac{bc^3}{a^3}$ (C) $\frac{c^2}{a^3}$ (D) none of these

11. The equation $x^{\frac{3}{4}(log_2 x)^2 + log_2 x - \frac{5}{4}} = \sqrt{2}$ has:

(A) atleast one real solution (B) exactly two irrational solutions
(C) exactly one rational solution (D) complex roots

12. If the equation $x^2 + 2|a|x + 4 = 0$ has integral roots, then minimum value of 'a' is:

(A) 4 (B) $-\frac{5}{2}$ (C) 0 (D) -4

13. If $b > a$, then the equation $(x-a)(x-b) - 1 = 0$ has:

(A) both roots in $[a, b]$
(B) both roots in $(-\infty, a)$
(C) both roots in (b, ∞)
(D) one root in $(-\infty, a)$ and other in (b, ∞).

14. The number of integral values of 'a' for which $(a+2)x^2 + 2(a+1)x + a = 0$ will have both roots integers is:

(A) 3 (B) 5 (C) 7 (D) none of these

15. If the equation $(x^2+x+3)^2 - (\lambda-4)(x^2+x+3)(x^2+x+2) + (\lambda-5)(x^2+x+2)^2 = 0$ has at least one real solution. Then find $[\lambda]$. (where [.] represents greatest integer function).

16. The number of real solutions of $1 + |e^x - 1| = e^x(e^x - 2)$ is:

17. If a is a positive integer and the roots of the equation $6x^2 - 11x + \alpha = 0$ are rational numbers, then the smallest value of a is:

18. If $\alpha \neq 0$ then the number of values of the pair (α, β) such that $\alpha + \beta + \frac{\beta}{\alpha} = \frac{1}{2}$ and $(\alpha+\beta)\frac{\beta}{\alpha} = -\frac{1}{2}$ is:

19. Suppose a and b are real numbers with $ab \neq 0$. If the three quadratic equations $x^2 + ax + 12 = 0$, $x^2 + bx + 15 = 0$, and $x^2 + (a+b)x + 36 = 0$ have a common negative root then $|a| + |b| =$ ___.

20. The number of integral values of C for which $\frac{x^2+2x+c}{x^2+4x+3c}$ can take all real values is:

21. If α and β are the roots of the equation $x^2 - ax + b = 0$ where $a = 2020$ and $A_n = \alpha^n + \beta^n$, then $(A_{n+1} + bA_{n-1})/A_n$ is:

22. If α and β are the roots of the equation $x^2 - 2x + 3 = 0$ then the sum of roots of the equation having roots as $\alpha^3 - 3\alpha^2 + 5\alpha - 2$ and $\beta^3 - \beta^2 + \beta + 5$ is:

(A) 1 (B) 3 (C) 5 (D) 7

23. A value of b for which the equations $x^2 + bx - 1 = 0$ and $x^2 + x + b = 0$ have one root in common is:

(A) $-\sqrt{2}$ (B) $-i\sqrt{3}$ (C) $i\sqrt{5}$ (D) $\sqrt{2}$

24. If α, β are real and α^2, β^2 are the roots of the equation $a^2x^2 - x + 1 - a^2 = 0$ $(\frac{1}{\sqrt{2}} < a < 1)$ and $\beta^2 \neq 1$ then $\beta^2 =$:

(A) a^2 (B) $\frac{1-a^2}{a^2}$ (C) $1 - a^2$ (D) $1 + a^2$

25. If one root of the equation $(l-m)x^2 + lx + 1 = 0$ is double the other and l is real, then what is the greatest value of m?

(A) $-\frac{9}{8}$ (B) $\frac{9}{8}$ (C) $-\frac{8}{9}$ (D) $\frac{8}{9}$

26. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3$ and $\beta^2 = 5\beta - 3$ then the equation having $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$ as its roots is:

(A) $3x^2 - 19x + 3 = 0$
(B) $3x^2 + 19x - 3 = 0$
(C) $3x^2 - 19x - 3 = 0$
(D) $x^2 - 5x + 3 = 0$

27. The real roots of the equation $x^2 + 5|x| + 4 = 0$ are:

(A) $\{-1, -4\}$ (B) $\{1, 4\}$ (C) $\{-4, 4\}$ (D) None of these

28. Consider $f(x) = x^2 - 3x + a + \frac{1}{a}, a \in R - \{0\}$, such that $f(3) > 0$ and $f(2) \leq 0$. If α and β are the roots of equation $f(x) = 0$ then the value of $\alpha^2 + \beta^2$ is equal to:

(A) greater than 11
(B) less than 5
(C) 5
(D) depends upon a and cannot be determined.

29. If $y = 2 + \dfrac{1}{4 + \dfrac{1}{4 + \ldots \infty}}$, then:

(A) $y = 6$ (B) $y = 5$ (C) $y = \sqrt{6}$ (D) $y = \sqrt{5}$

30. If the roots of $ax^2 + bx + c = 0$ are the reciprocals of those of $lx^2 + mx + n = 0$ then $a : b : c =$:

(A) $n : m : l$ (B) $l : m : n$ (C) $m : n : l$ (D) $n : l : m$

31. For the equation $|x^2| + |x| - 6 = 0$, the roots are:

(A) One and only one real number
(B) Real with sum one
(C) Real with sum zero
(D) Real with product zero

32. If α, β be the roots of the equation $x^2 - px + q = 0$ then the equation whose roots are $\alpha^2(\frac{\alpha^2}{\beta} - \beta)$ and $\beta^2(\frac{\beta^2}{\alpha} - \alpha)$ is:

(A) $qx^2 - p(p^2 - q)(p^2 - 4q)x - p^2q^2(p^2 - 4q) = 0$
(B) $px^2 - q(p^2 - p)(p^2 - 4q)x + p^2q^2(p^2 - 4q) = 0$
(C) $px^2 - qx + p = 0$
(D) None of these

33. If $(7 - 4\sqrt{3})^{x^2-4x+3} + (7 + 4\sqrt{3})^{x^2-4x+3} = 14$, then the value of x is given by:

(A) $2, 2 \pm \sqrt{2}$ (B) $2 \pm \sqrt{3}, 3$ (C) $3 \pm \sqrt{2}, 2$ (D) None of these

34. If the roots of the equation $(x - a)(x - b) + (x - b)(x - c) + (x - c)(x - a) = 0$ are equal, then $a^2 + b^2 + c^2 =$:

(A) $a + b + c$ (B) $2a + b + c$ (C) 3abc (D) $ab + bc + ca$

35. If the product of the roots of the equation $x^2 - 5kx + 2e^{4 \ln k} - 1 = 0$ is 31, then sum of the root is:

(A) -10 (B) 5 (C) -8 (D) none of these

36. The set of all real numbers x for which $x^2 - |x + 2| + x > 0$, is:

(A) $(-\infty, -2) \cup (2, \infty)$
(B) $(-\infty, -\sqrt{2}) \cup (\sqrt{2}, \infty)$
(C) $(-\infty, -1) \cup (1, \infty)$
(D) $(\sqrt{2}, \infty)$

37. If both the roots of the equation $x^2 - 2kx + k^2 - 4 = 0$ lie between -3 and 5, then which one of the following is correct?

(A) $-2 < k < 2$ (B) $-5 < k < 3$ (C) $-3 < k < 5$ (D) $-1 < k < 3$

38. If a and b are the non-zero distinct roots of $x^2 + ax + b = 0$, then the least value of $x^2 + ax + b$ is:

(A) $\frac{2}{3}$ (B) $\frac{9}{4}$ (C) $-\frac{9}{4}$ (D) 1

39. If the quadratic equation $x^2 + 2(k + 1)x + 9k - 5 = 0$ has exactly one positive root, then k lies in the set:

(A) $[5/9, \infty)$
(B) $(-\infty, 1) \cup (6, \infty)$
(C) $(-\infty, 5/9]$
(D) [1,6]

40. If α and β are the roots of $4x^2 - 16x + t = 0, \forall t > 0$ such that $1 < \alpha < 2 < \beta < 3$ then the number of integral values of t are:

(A) 2 (B) 3 (C) 4 (D) 5

41. For the equation $|x^2 - 2x - 3| = b$, which of the following statements is true?

(A) For $b < 0$ there are no solutions
(B) For $b = 0$, there are three solutions
(C) For $0 < b < 4$ there are two solutions
(D) For $b = 4$ there are four solutions

42. Let a, b, c, d be distinct real numbers such that a, b are roots of $x^2 - 5cx - 6d = 0$, and c, d are roots of $x^2 - 5ax - 6b = 0$. Then $b + d$ is:

(A) 180 (B) 162 (C) 144 (D) 126

43. If the equation $x^2 + 2(k+1)x + 9k - 5 = 0$ has only negative roots, then:

(A) $k \leq 0$ (B) $k \geq 0$ (C) $k \geq 6$ (D) $k \leq 6$

44. If $A = \{x \in \mathbb{R} : x^2 + 6x - 7 < 0\}$ and $B = \{x \in \mathbb{R} : x^2 + 9x + 14 > 0\}$ then which of the following is/ are correct?

1. $(A \cap B) = (-2, 1)$
2. $(A \cup B) = (-7, -2)$

Select the correct answer using the code given below:
(A) 1 only (B) 2 Only (C) Both 1 and 2 (D) Neither 1 nor 2

45. The roots of the equation $|x^2 - x - 6| = x + 2$ are:

(A) $(-2, 1, 4)$ (B) $(0, 2, 4)$ (C) $(0, 1, 4)$ (D) $(-2, 2, 4)$

46. If equations $ax^2 + bx + c = 0, (a, b, c \in \mathbb{R}, a \neq 0)$ 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

47. If α, β, γ are the roots of the equation $x^3 + qx + r = 0$ then the equation whose roots are $-\alpha^{-1}, -\beta^{-1}, -\gamma^{-1}$ is:

(A) $rx^3 + qx^2 - 1 = 0$
(B) $rx^3 - qx^2 - 1 = 0$
(C) $rx^3 + qx^2 + 1 = 0$
(D) $rx^3 - qx^2 + 1 = 0$

48. The number of distinct real roots of the equation $(x+3)^4 + (x+5)^4 = 16$ is:

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

49. Let α and β be the roots of equation $x^2 - 6x - 2 = 0$. If $a_n = \alpha^n - \beta^n$, for $n \geq 1$, then the value of $\frac{a_{10} - 2a_8}{2a_9}$ is equal to:

(A) 6 (B) -6 (C) 3 (D) -3

Answer Key

1 (D)	**2** (D)	**3** (D)	**4** (B)	**5** (A)	**6** (D)	**7** (C)	**8** (C)	**9** (B)	**10** (A)
11 (A)	**12** (B)	**13** (D)	**14** (D)	**15** (6)	**16** (1)	**17** (3)	**18** (2)	**19** (15)	**20** (2)
21 (2020)	**22** (B)	**23** (B)	**24** (B)	**25** (B)	**26** (A)	**27** (D)	**28** (C)	**29** (D)	**30** (A)
31 (C)	**32** (A)	**33** (A)	**34** (D)	**35** (D)	**36** (B)	**37** (D)	**38** (C)	**39** (C)	**40** (B)
41 (A)	**42** (C)	**43** (C)	**44** (C)	**45** (D)	**46** (B)	**47** (B)	**48** (B)	**49** (C)	