DPP: 2
Subject: Mathematics
Topic: Quadratic Equations

1. For what value of m, the roots of the equation $x^2 - x + m = 0$ are not real -

(a) $]\frac{1}{4}, \infty[$ (b) $]-\infty, \frac{1}{4}[$ (c) $]-\frac{1}{4}, \frac{1}{4}[$ (d) None of these

2. If the roots of the equation $x^2 + 2x + P = 0$ are real then the value of P is -

(a) $P \le 2$ (b) $P \le 1$ (c) $P \le 3$ (d) None of these

3. For what value of k does the equation $(k-1)x^2 + 2(k+1)x + (k-2) = 0$ have equal roots?

4. The number of positive integral values of k for which $\left(16x^2 + 12x + 39\right) + k\left(9x^2 - 2x + 11\right)$ is a perfect square, is

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

5. The number of values of k for which $\left\{x^2 - (k-2)x + k^2\right\}\left\{x^2 + kx + (2k-1)\right\}$ is perfect square, is

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

6. The equation $x^2 - 1 = a^2 - 2a - 4$ can have real solution for x if a belongs to

(A) $(-\infty, -1] \cup [3, +\infty)$ (B) $[1 - \sqrt{5}, 1 + \sqrt{5}]$

(C) $[1 - \sqrt{5}, -1] \cup [3, 1 + \sqrt{5}]$ (D) None of these

7. The least integral value of 'a' for which the graphs of the functions $y = 2ax + 1$ and $y = (a - 6)x^2 - 2$ do not intersect :

(A) – 6 (B) –5 (C) 3 (D) 2

8. Let g be a cont. function & attains only rational values .If $g(0) = 5$,then the roots of $\left(g(2009)\right)x^2 + \left(g(2008)\right)x + \left(g(2010)\right) = 0$ are:

(a) Real&equal (b) Real&unequal (c) Rational (d) Imaginary

9. If the roots of the equation $(\cos p - 1)\, x^2 + (\cos p)\, x + \sin p = 0$. (x is variable) real then —

(a) $p \in (0, 2\pi)$ (b) $p \in (-\pi, 0)$ (c) $p \in (-\pi/2, \pi/2)$ (d) $p \in (0, \pi)$

10. $x^2 + (a - b)\, x + (1 - a - b) = 0$, $a, b \in R$. Find the condition on a, for which both roots of the equations are real and unequal for all values of b.

11. The roots of the equation $\left(a^2 + b^2\right)x^2 - 2\left(bc + ad\right)x + \left(c^2 + d^2\right) = 0$ are equal, if -

(a) ab = cd (b) ac = bd (c) ad + bc = 0 (d) None of these

12.c If the expression, $a^2\left(b^2 - c^2\right)x^2 + b^2\left(c^2 - a^2\right)x + c^2\left(a^2 - b^2\right)$ is a perfect square, then

(a) a, b, c, are in A.P. (b) a^2, b^2, c^2 are in A.P.
(c) a^2, b^2, c^2 are in H.P. (d) a^2, b^2, c^2 are in G.P.

13.a The roots of the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ are equal, then a, b, c are in

(a) H.P (b) G.P. (c) A.P. (d) None of these

14. If the roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal, prove that $c + a - 2b = 0$

15. If the roots of the equation $(a^2 + 2b^2 - 2b)x^2 + 2a(1+b)x + (a^2 + 2 - 2b) = 0$ are equal, prove that $a^2 = 4b$

16. Let $p,q \in \{1,2,3,4\}$. The number of equations of the form $px^2 + qx + 1 = 0$ having real roots is -

(a) 15 (b) 9 (c) 7 (d) 8

17. If the quadratic equation $(ab - bc)x^2 + (bc - ca)x + ca - ab = 0$, a, b, c $\in$ R, has both the roots equal, then

(A) both roots are equal to 0
(B) both roots are equal to 1
(C) a, c, b are in harmonic progression
(D) ab^2c^2, b^2c, a^2c^2 are in a arithmetic progression

18. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + (b^2 - ac) = 0$ are equal prove that either a =0 or $a^3 + b^3 + c^3 = 3abc$

19. If the roots of the equation $6x^2 - 7x + k = 0$ are rational then k is equal to -

(a) –1 (b) –1, –2 (c) –2 (d) 1, 2

20. The equation $2x^2 + 3x + 1 = 0$ has an irrational root.

21. For what integral value of a are the roots of the equation $ax^2 + (2a - 1)x + (a - 2) = 0$ rational?

22. The roots of the equation $(x - 1)(x - b) = h^2$ are, $a, b, h \in R$

(a) always real
(b) always non-real
(c) real or non-real depending on a, b, h
(d) real and equal

23. The roots of the equation $(x - a)(x - b) = ab\,x^2$, $(a, b, \in \mathbf{Q})$ are

(a) real-rational (b) real-irrational (c) real and equal (d) real

24. Show that the roots of the equation $\frac{1}{x-1} + \frac{1}{x} + \frac{1}{x-p} = 0$ are real for all values of p.

25. If a + b + c = 0 and a, b, c are rational numbers then the roots of the equation $(b + c - a)x^2 + (c + a - b)x + (a + b - c) = 0$ are

(a) rational (b) irrational (c) non real (d) none of these

26. If a and b are the odd integers, then the roots of the equation $2ax^2 + (2a + b)x + b = 0,\ a \neq 0,$ will be-

(a) rational (b) irrational (c) non-real (d) equal

27. Roots of the quadratic equation $(b + c)x^2 - (a + b + c)x + a = 0 (a, b, c \in Q, b + c \neq a)$ are :

(a) Rational & unequal (b) Imaginary & equal (c) Irrational & unequal (d) Imaginary & unequal

28. If $(a - b)x^2 + (b - c)x + (c - a) = 0, (where\ a, b, c \in Q)$ then roots of the quadratic are:

(a) rational & equal (b) irrational&unequal (c) Imaginary (d) rational & unequal

29. If $a(b - c)x^2 + b(c - a)x + c(a - b) = 0, (where\ a, b, c \in Q)$ then roots of the quadratic are:

(a) rational & equal (b) irrational&unequal (c) Imaginary (d) rational & unequal

30. If $(a + b - 2c)x^2 + (b + c - 2a)x + (c + a - 2b) = 0, (where\ a, b, c \in Q)$ then roots of the quadratic are:

(a) rational & equal (b) irrational&unequal (c) Imaginary (d) rational & unequal

31. **Statement-1 :** The quadratic equation $(a - b)x^2 + (b - c)x + (c - a) = 0$ have one root x = 1
Statement-2 : If sum of the co-efficients in a quadratic equation vanishes then its one root is x = 1.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct a explanation for Statement1.
(B) Statement-1 is True, Statement-2 is True; STatement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

32. Prove that the roots of the equation $(a + 2b - 3c)x^2 + (b + 2c - 3a)x + (c + 2a - 3b) = 0$ are rational if a, b, c are rational. Hence determine the roots of the equation.

33. Consider the quadratic equation $(a_1 + a_3 - a_2)x^2 + 2a_3 x + (a_2 + a_3 - a_1) = 0$, where a_1, a_2, a_3 are distinct real number and $a_1 + a_3 - a_2 \neq 0$. If both the roots of the equation are rational then.

(A) a_1 and a_2 are rational (B) $\frac{a_3}{a_1 - a_2}$ is rational (C) $\frac{a_2}{a_3 - a_1}$ is rational (D) $\frac{a_1}{a_2 - a_3}$ is rational

34. Prove that the equation $3x^2 + 2(a+b+c)x + (a^2 + b^2 + c^2) = 0$ cannot have real roots unless $a = b = c$.

35. Show that if the roots of the equation $(a_1^2 + a_2^2)x^2 + 2(a_1b_1 + a_2b_2)x + (b_1^2 + b_2^2) = 0$ are real, then they will be equal.

36. If $a, b \in R$, $a \neq 0$ and the quadratic equation $ax^2 - bx + 1 = 0$ has imaginary roots then $a + b + 1$ is:
(A) positive (B) negative (C) zero (D) depends on the sign of b .

37. The quadratic equation $ax^2 + bx + c = 0$ has imaginary roots if
(A) $a < -1, 0 < c < 1, b > 0$
(B) $a < -1, -1 < c < 0, 0 < b < 1$
(C) $a < -1, c < 0, b > 1$
(D) none of these

38. If the quadratic equation, $ax^2 + bx + a^2 + b^2 + c^2 - ab - bc - ca = 0$ where a , b , c are distinct reals, has imaginary roots then :
(A) $2(a - b) + (a - b)^2 + (b - c)^2 + (c - a)^2 > 0$
(B) $2(a - b) + (a - b)^2 + (b - c)^2 + (c - a)^2 < 0$
(C) $2(a - b) + (a - b)^2 + (b - c)^2 + (c - a)^2 = 0$
(D) none

39. Prove that the roots of the quadratic equation
$abc^2x^2 + 3a^2cx + b^2cx - 6a^2 - ab + 2b^2 = 0$ $(a, b, c \in Q)$ are rational.

40. Roots of the quadratic equation $x^2 - 2(a+b)x + 2(a^2 + b^2) = 0 (where\ a \neq 0)$ are :
(a) Rational & unequal (b) Rational and equal (c) Irrational & unequal (d) Imaginary & unequal

41. If roots of the equation $(a^4 + b^4)x^2 + 4abcdx + (c^4 + d^4) = 0$ are real then they are :
(a) unequal
(b) equal
(c) Rational and unequal
(d) Irrational and unequal

42. If roots of the equation $(a^2 + b^2)x^2 + 2x(ac + bd) + (c^2 + d^2) = 0$ are real then they are :
(a) unequal
(b) equal
(c) Rational and unequal
(d) Irrational and unequal

43. If $a<c<b$ then the roots of the equation $(a-b)^2x^2 + 2(a+b-2c)x + 1 = 0$ are :
(a) imaginary
(b) real
(c) one real and one imaginary roots
(d) equal and imaginary

44. If $a, b, \in R$ and $ax^2 + bx + 6 = 0$, $a \neq 0$ does not have two distinct real roots, then
(A) Minimum possible value of $3a + b$ is -2
(B) Minimum possible value of $3a + b$ is 2
(C) Minimum possible value of $6a + b$ is -1
(D) Minimum possible value of $6a + b$ is 1

ANSWER KEY

1.a 2.b 3.k=1/5 4.b 5.a 6.a 7.b 8.d 9.d 10.a>1 11.b 12.c 13.a 16.c 17.bcd 19.d 20.False 22.a 23.a 25.a 26.a 27.a 28.d 29.d 30.d 31.a 33.d 36.a 37.d 38.a 40.d 41.b 42.b 43.a 44.a