विघ्न विचारत भीरु जन, नहीं आरम्भे काम,
विपति देख छोड़े तुरंत मध्यम मन कर श्याम।
पुरुष सिंह संकल्प कर, सहते विपति अनेक,
'बना' न छोड़े ध्येय को, रघुबर राखे टेक।।

रचित: मानव धर्म प्रणेता
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QUADRATIC EQUATIONS

Some questions (Assertion–Reason type) are given below. Each question contains **Statement – 1 (Assertion)** and **Statement – 2 (Reason)**. Each question has 4 choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct. So select the correct choice :

Choices are :

(A) **Statement – 1** is True, **Statement – 2** is True; **Statement – 2 is** a correct explanation for **Statement – 1**.
(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.

1. **Statement-1:** If $x \in R$, $2x^2 + 3x + 5$ is positive.
Statement-2: If $\Delta < 0$, $ax^2 + bx + c$, 'a' have same sign $\forall x \in R$.

2. **Statement-1:** If $1+\sqrt{2}$ is a root of $x^2 - 2x - 1 = 0$, then $1-\sqrt{2}$ will be the other root.
Statement-2: Irrational roots of a quadratic equation with rational coefficients always occur in conjugate pair.

3. **Statement-1:** The roots of the equation $2x^2 + 3i\,x + 2 = 0$ are always conjugate pair.
Statement-2: Imaginary roots of a quadratic equation with real coefficients always occur in conjugate pair.

4. Consider the equation $(a^2 - 3a + 2)\,x^2 + (a^2 - 5a + 6)x + a^2 - 1 = 0$
Statement – 1: If a = 1, then above equation is true for all real x.
Statement – 2: If a = 1, then above equation will have two real and distinct roots.

5. Consider the equation $(a + 2)x^2 + (a - 3)\,x = 2a - 1$
Statement–1 : Roots of above equation are rational if 'a' is rational and not equal to –2.
Statement–2 : Roots of above equation are rational for all rational values of 'a'.

6. Let $f(x) = x^2 = -x^2 + (a + 1)\,x + 5$
Statement–1 : f(x) is positive for same $\alpha < x < \beta$ and for all $a \in R$
Statement–2 : f(x) is always positive for all $x \in R$ and for same real 'a'.

7. Consider $f(x) = (x^2 + x + 1)\,a^2 - (x^2 + 2)\,a$
$-3\,(2x^2 + 3x + 1) = 0$
Statement–1 : Number of values of 'a' for which f(x) = 0 will be an identity in x is 1.
Statement–2 : a = 3 the only value for which f(x) = 0 will represent an identity.

8. Let a, b, c be real such that $ax^2 + bx + c = 0$ and $x^2 + x + 1 = 0$ have a common root
Statement–1 : a = b = c
Statement–2 : Two quadratic equations with real coefficients can not have only one imaginary root common.

9. **Statement–1** : The number of values of a for which $(a^2 - 3a + 2)\,x^2 + (a^2 - 5a + b)\,x + a^2 - 4 = 0$ is an identity in x is 1.
Statement–2 : If $ax^2 + bx + c = 0$ is an identity in x then a = b = c = 0.

10. Let $a \in (-\infty, 0)$.
Statement–1 : $ax^2 - x + 4 < 0$ for all $x \in R$
Statement–2 : If roots of $ax^2 + bx + c = 0$, $b, c \in R$ are imaginary then signs of $ax^2 + bx + c$ and a are same for all $x \in R$.

11. Let $a, b, c \in R$, $a \neq 0$.
Statement–1 : Difference of the roots of the equation $ax^2 + bx + c = 0$
= Difference of the roots of the equation $-ax^2 + bx - c = 0$
Statement–2 : The two quadratic equations over reals have the same difference of roots if product of the coefficient of the two equations are the same.

12. **Statement–1** : If the roots of $x^5 - 40x^4 + Px^3 + Qx^2 + Rx + S = 0$ are in G.P. and sum of their reciprocal is 10, then $|S| = 32$.
Statement–2 : $x_1 . x_2 . x_3 . x_4 . x_5 = S$, where x_1, x_2, x_3, x_4, x_5 are the roots of given equation.

13. **Statement–1** : If $0 < \alpha < \dfrac{\pi}{4}$, then the equation $(x - \sin\alpha)\,(x - \cos\alpha) - 2 = 0$ has both roots in $(\sin\alpha, \cos\alpha)$

Statement–2 : If f(a) and f(b) possess opposite signs then there exist at least one solution of the equation $f(x) = 0$ in open interval (a, b).

14. **Statement–1 :** If $a \geq 1/2$ then $\alpha < 1 < p$ where α, β are roots of equation $-x^2 + ax + a = 0$
Statement–2 : Roots of quadratic equation are rational if discriminant is perfect square.

15. **Statement-1 :** The number of real roots of $|x|^2 + |x| + 2 = 0$ is zero. **Statement-2 :** $\forall x \in R$, $|x| \geq 0$.

16. **Statement-1:** If all real values of x obtained from the equation $4^x - (a-3)\,2^x + (a-4) = 0$ are non-positive, then $a \in (4, 5]$
Statement-2: If $ax^2 + bx + c$ is non-positive for all real values of x, then $b^2 - 4ac$ must be –ve or zero and 'a' must be –ve.

17. **Statement-1:** If $a, b, c, d \in R$ such that $a < b < c < d$, then the equation $(x-a)(x-c) + 2(x-b)(x-d) = 0$ are real and distinct.
Statement-2: If $f(x) = 0$ is a polynomial equation and a, b are two real numbers such that $f(a)\,f(b) < 0$ has at least one real root.

18. **Statement-1:** $f(x) = \dfrac{x^2+x+1}{x^2+2x+5} > 0 \ \forall x \in R$
Statement-2: $ax^2 + bx + c > 0 \ \forall x \in R$ if $a > 0$ and $b^2 - 4ac < 0$.

19. **Statement-1:** If $a + b + c = 0$ then $ax^2 + bx + c = 0$ must have '1' as a root of the equation
Statement-2: If $a + b + c = 0$ then $ax^2 + bx + c = 0$ has roots of opposite sign.

20. **Statement-1:** $ax^2 + bx + c = 0$ is a quadratic equation with real coefficients, if $2 + \sqrt{3}$ is one root then other root can be any other real number.
Statement-2: If $P + \sqrt{q}$ is a real root of a quadratic equation, then $P - \sqrt{q}$ is other root only when the coefficients of equation are rational

21. **Statement-1:** If $px^2 + qx + r = 0$ is a quadratic equation ($p, q, r \in R$) such that its roots are α, β & $p + q + r < 0$, $p - q + r < 0$ & $r > 0$, then $3[\alpha] + 3[\beta] = -3$, where $[\cdot]$ denotes G.I.F.
Statement-2: If for any two real numbers a & b, function f(x) is such that $f(a).f(b) < 0 \Rightarrow f(x)$ has at least one real root lying between (a, b)

22. **Statement-1:** If $x = 2 + \sqrt{3}$ is a root of a quadratic equation then another root of this equation must be $x = 2 + \sqrt{3}$
Statement-2: If $ax^2 + bx + c = 0$, $a, b, c \in Q$, having irrational roots then they are in conjugate pairs.

23. **Statement-1:** If roots of the quadratic equation $ax^2 + bx + c = 0$ are distinct natural number then both roots of the equation $cx^2 + bx + a = 0$ cannot be natural numbers.
Statement-2: If α, β be the roots of $ax^2 + bx + c = 0$ then $\dfrac{1}{\alpha}, \dfrac{1}{\beta}$ are the roots of $cx^2 + bx + a = 0$.

24. **Statement-1:** The $(x-p)(x-r) + \lambda(x-q)(x-s) = 0$ where $p < q < r < s$ has non real roots if $\lambda > 0$.
Statement-2: The equation ($p, q, r \in R$) $\beta x^2 + qx + r = 0$ has non-real roots if $q^2 - 4pr < 0$.

25. **Statement-1:** One is always one root of the equation $(l - m)x^2 + (m - n)x + (n - l) = 0$, where $l, m, n \in R$.
Statement-2: If $a + b + c = 0$ in the equation $ax^2 + bx + c = 0$, then 1 is the one root.

26. **Statement-1:** If $(a^2 - 4)x^2 + (a^2 - 3a + 2)x + (a^2 - 7a + 0) = 0$ is an identity, then the value of a is 2.
Statement-2: If $a = b = 0$ then $ax^2 + bx + c = 0$ is an identity.

27. **Statement-1:** $x^2 + 2x + 3 > 0 \ \forall x \in R$
Statement-2: $ax^2 + bx + c > 0 \ \forall x \in R$ if $b^2 - 4ac < 0$ and $a > 0$.

28. **Statement-1:** Maximum value of $\dfrac{1}{2^{x^2-x+1}}$ is $\dfrac{1}{2^{3/4}}$
Statement-2: Minimum value of $ax^2 + bx + c$ $(a > 0)$ occurs at $x = -\dfrac{b}{2a}$.

29. **Statement-1:** If quadratic equation $ax^2 + bx - 2 = 0$ have non-real roots then $a < 0$
Statement-2: For the quadratic expression $f(x) = ax^2 + bx + c$ if $b^2 - 4ac < 0$ then $f(x) = 0$ have non real roots.

30. **Statement-1:** Roots of equation $x^5 - 40x^4 + Px^3 + Qx^2 + Rx + S = 0$ are in G.P. and sum of their reciprocal is equal to 10 then $|s| = 32$.
Statement-2: If x_1, x_2, x, x_4 are roots of equation

$$ax^4 + bx^3 + cx^2 + dx + e = 0 \ (a \neq 0)$$
$$x_1 + x_2 + x_3 + x_4 = -b/a$$
$$\sum x_1x_2 = \frac{c}{a}$$
$$\sum x_1x_2x_3 = -\frac{d}{a} \qquad x_1x_2x_3x_4 = \frac{e}{a}$$

31. **Statement-1:** The real values of a form which the quadratic equation $2x^2 – (a^3 + 8a – 1) + a^2 – 4a = 0$. Possesses roots of opposite signs are given by $0 < a < 4$.
Statement-2: Disc ≥ 0 and product of root is < 2

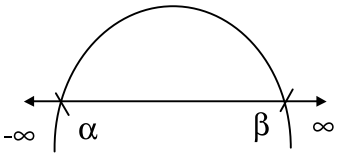
ANSWER KEY

1. A	**2. A**	**3. D**	**4. C**	**5. C**	**6. C**	**7. D**	**8. A**	**9. A**	**10. D**	**11. C**	**12. C**
13. D	**14. B**	**15. A**	**16. B**	**17. A**	**18. A**	**19. C**	**20. A**	**21. A**	**22. A**	**23. A**	**24. D**
25. A	**26. C**	**27. A**	**28. A**	**29. A**	**30. A**	**31. A**					

Solution

5. Obviously $x = 1$ is one of the root
$\therefore$ Other root $= - -\dfrac{2a-1}{a+2}$ = rational for all rational $a \neq –2$.
(C) is correct option.

6. Here f(x) is a downward parabola
$D = (a + 1)^2 + 20 > 0$
From the graph clearly st (1) is true but st (2) is false



7. $f(x) = 0$ represents an identity if $a^2 – a – 6 = 0 \Rightarrow a = 3, –2$
$a^2 – a – 6 = 0 \Rightarrow a = 3, –2$
$a^2 – a = 0 \Rightarrow a = 3, –3$
$a^2 – 2a –3 =0 \Rightarrow a = 3, –1 \Rightarrow a = 3$ is the only values. Ans.: D

8. (A)
$x^2 + x + 1 = 0$
$D = – 3 < 0$ $\therefore$ $x^2 + x + 1 = 0$ and $ax^2 + bx + c = 0$ have both the roots common
$\Rightarrow a = b = c.$

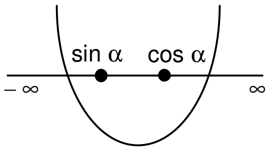
9. (A)
$(a^2 – 3a + 2) x^2 + (a^2 – 5a + 6) x + a^2 – 4 = 0$
Clearly only for $a = 2$, it is an identify.

10. Statement – II is true as if $ax^2 + bx + c = 0$ has imaginary roots, then for no real x, $ax^2 + bx + c$ is zero, meaning thereby $ax^2 + bx + c$ is always of one sign. Further $\lim\limits_{x\to\infty}\left(ax^2+bx+c\right)$ = signum (a). ∞
statement – I is false, because roots of $ax^2 – x + 4 = 0$ are real for any $a \in (- \infty, 0)$ and hence $ax^2 – x + 4$ takes zero, positive and negative values.
Hence (d) is the correct answer.

11. Statement–I is true, as Difference of the roots of a quadratic equation is always $\sqrt{D}$, D being the discriminant of the quadratic equation and the two given equations have the same discriminant.
Statement – II is false as if two quadratic equations over reals have the same product of the coefficients, their discriminents need not be same.
Hence (c) is the correct answer.

12. Roots of the equation $x^5 – 40x^4 + px^3 + qx^2 + rx + s = 0$ are in G.P., let roots be a, ar, ar^2, ar^3, ar^4
$\therefore$ $a + ar + ar^2 + ar^3 + ar^4 = 40$ . . . (i)
and $\dfrac{1}{a}+\dfrac{1}{ar}+\dfrac{1}{ar^2}+\dfrac{1}{ar^3}+\dfrac{1}{ar^4}=10$ . . . (ii)
from (i) and (ii); $ar^2 = \pm 2$ . . . (iii)
Now, - S = product of roots $= a^5r^{10} = (ar^2)^5 = \pm 32$.
$\therefore$ $|s| = 32$. $\therefore$ Hence (c) is the correct answer.

13. Let, $f(x) = (x – \sin\alpha) (x – \cos\alpha) – 2$
then, $f(\sin\alpha) = - 2 < 0$; $f(\cos\alpha) = - 2 < 0$
Also as $0 < \alpha < \dfrac{\pi}{4}$; $\therefore$ $\sin\alpha < \cos\alpha$
There-fore equation $f(x) = 0$ has one root in $(- \infty, \sin\alpha)$ and other in $(\cos\alpha, \infty)$
Hence (c) is the correct answer.



Hence (d) is the correct answer.

14. (B) $x^2 - ax - a = 0$ $g(1) < 0 \Rightarrow a > 1/2$

15. equation can be written as $(2^x)^2 - (a-4)\,2^x - (a-4) = 0$
$\Rightarrow 2^x = 1$ & $2^x = a - 4$
Since $x \le 0$ and $2^x = a - 4$ [$\because$ x is non positive] $\therefore$
$0 < a - 4 \le 1 \Rightarrow 4 < a \le 5$
i.e., $a \in (4, 5]$
Hence ans. (B).

16. (A) Let $f(x) = (x-a)(x-c) + 2(x-b)(x-d)$
Then $f(a) = 2(a-b)(a-d) > 0$
$f(b) = (b-a)(b-c) < 0$
$f(d) = (d-a)(d-b) > 0$
Hence a root of $f(x) = 0$ lies between a & b and another root lies between (b & d).
Hence the roots of the given equation are real and distinct.

17. $x^2 + x + 1 > 0\ \forall x \in R$
$a = 1 > 0$
$b^2 - 4ac = 1 - 4 = -3 < 0$
$x^2 + 2x + 5 > 0\ \forall x \in R$
$a = 1 > 0$
$b^2 - 4ac = 4 - 20 = -16 < 0$
So $\dfrac{x^2 + x + 1}{x^2 + 2x + 5} > 0\ \forall x \in R$ 'a' is correct

18. $ax^2 + bx + c = 0$
Put x = 1
a + b + c = 0 which is given
So clearly '1' is the root of the equation
Nothing can be said about the sign of the roots.
'c' is correct.

19. (A) If the coefficients of quadratic equation are not rational then root may be $2 + \sqrt{3}$ and $2 + \sqrt{3}$.

20. (D) R is obviously true. So test the statement let $f(x) = (x-p)(x-r) + \lambda(x-q)(x-s) = 0$
Then $f(p) = \lambda(p-q)(p-s)$
$f(r) = \lambda(r-q)(r-s)$
If $\lambda > 0$ then $f(p) > 0$, $f(r) < 0$
$\Rightarrow$ There is a root between p & r
Thus statement-1 is false.

21. (A) Both Statement-1 and Statement-2 are true and Statement-2 is the correct explanation of Statement-1.

22. (C) Clearly Statement-1 is true but Statement-2 is false.
$\because$ $ax^2 + bx + c = 0$ is an identity when a = b = c = 0.

23. (A) for $x^2 + 2x + 3$
a > 0 and D < 0

24. (A) $x^2 - x + 1$
$$= \left(x - \frac{1}{2}\right)^2 + \frac{3}{4}$$

25. The roots of the given equation will be of opposite signs. If they are real and their product is negative
D ≥ 0 and product of root is < 0
$\Rightarrow (a^3 - 8a - 1)^2 - 8(a^2 - 4a) \ge 0$ and $\dfrac{a^2 - 4a}{2} < 0$
$\Rightarrow a^2 - 4a < 0$
$\Rightarrow 0 < a < 4$.
Ans. (a)

Que. from Compt. Exams

1. If $x = \sqrt{1 + \sqrt{1 + \sqrt{1 + ... \text{to infinity}}}}$, then $x =$

(a) $\dfrac{1+\sqrt{5}}{2}$ (b) $\dfrac{1-\sqrt{5}}{2}$

(c) $\dfrac{1 \pm \sqrt{5}}{2}$ (d) None of these

2. For the equation $|x^2| + |x| - 6 = 0$, the roots are **[EAMCET 1988, 93]**
(a) One and only one real number (b) Real with sum one
(c) Real with sum zero (d) Real with product zero

3. If $ax^2 + bx + c = 0$, then $x =$ **[MP PET 1995]**

(a) $\frac{b \pm \sqrt{b^2 - 4ac}}{2a}$ (b) $\frac{-b \pm \sqrt{b^2 - ac}}{2a}$
(c) $\frac{2c}{-b \pm \sqrt{b^2 - 4ac}}$ (d) None of these

4. If the equations $2x^2 + 3x + 5\lambda = 0$ and $x^2 + 2x + 3\lambda = 0$ have a common root, then $\lambda =$ **[RPET 1989]**
(a) 0 (b) –1 (c) 0,–1 (d) 2,–1

5. If the equation $x^2 + \lambda x + \mu = 0$ has equal roots and one root of the equation $x^2 + \lambda x - 12 = 0$ is 2, then $(\lambda, \mu) =$
(a) (4, 4) (b) (–4,4) (c) (4,–4) (d) (–4,–4)

6. If x is real and $k = \frac{x^2 - x + 1}{x^2 + x + 1}$, then **[MNR 1992; RPET 1997]**
(a) $\frac{1}{3} \le k \le 3$ (b) $k \ge 5$ (c) $k \le 0$ (d) None of these

7. If $a < b < c < d$, then the roots of the equation $(x-a)(x-c) + 2(x-b)(x-d) = 0$ are **[IIT 1984]**
(a) Real and distinct (b) Real and equal (c) Imaginary (d) None of these

8. If the roots of the equation $qx^2 + px + q = 0$ where p, q are real, be complex, then the roots of the equation $x^2 - 4qx + p^2 = 0$ are
(a) Real and unequal (b) Real and equal (c) Imaginary (d) None of these

9. The values of 'a' for which $(a^2 - 1)x^2 + 2(a-1)x + 2$ is positive for any x are **[UPSEAT 2001]**
(a) $a \ge 1$ (b) $a \le 1$ (c) $a > -3$ (d) $a < -3$ or $a > 1$

10. If the roots of equation $\frac{x^2 - bx}{ax - c} = \frac{m-1}{m+1}$ are equal but opposite in sign, then the value of m will be
[RPET 1988, 2001; MP PET 1996, 2002; Pb. CET 2000]
(a) $\frac{a-b}{a+b}$ (b) $\frac{b-a}{a+b}$ (c) $\frac{a+b}{a-b}$ (d) $\frac{b+a}{b-a}$

11. The coefficient of x in the equation $x^2 + px + q = 0$ was taken as 17 in place of 13, its roots were found to be –2 and –15, The roots of the original equation are **[IIT 1977, 79]**
(a) 3, 10 (b) – 3, – 10 (c) – 5, – 18 (d) None of these

12. If one root of the equation $ax^2 + bx + c = 0$ be n times the other root, then
(a) $na^2 = bc(n+1)^2$ (b) $nb^2 = ac(n+1)^2$ (c) $nc^2 = ab(n+1)^2$ (d) None of these

13. If one root of the quadratic equation $ax^2 + bx + c = 0$ is equal to the n^{th} power of the other root, then the value of $(ac^n)^{\frac{1}{n+1}} + (a^n c)^{\frac{1}{n+1}} =$ **[IIT 1983]**
(a) b (b) $-b$ (c) $b^{\frac{1}{n+1}}$ (d) $-b^{\frac{1}{n+1}}$

14. If $\sin\alpha, \cos\alpha$ are the roots of the equation $ax^2 + bx + c = 0$, then **[MP PET 1993]**
(a) $a^2 - b^2 + 2ac = 0$ (b) $(a-c)^2 = b^2 + c^2$ (c) $a^2 + b^2 - 2ac = 0$ (d) $a^2 + b^2 + 2ac = 0$

15. If both the roots of the quadratic equation
$$x^2 - 2kx + k^2 + k - 5 = 0$$
are less than 5, then k lies in the interval **[AIEEE 2005]**
(a) $(-\infty, 4)$ (b) [4, 5] (c) (5, 6] (d) $(6, \infty)$

16. If the roots of the equations $x^2 - bx + c = 0$ and $x^2 - cx + b = 0$ differ by the same quantity, then $b + c$ is equal to **[BIT Ranchi 1969; MP PET 1993]**
(a) 4 (b) 1 (c) 0 (d) –4

17. If the product of roots of the equation
$$x^2 - 3kx + 2e^{2\log k} - 1 = 0$$
is 7, then its roots will real when **[IIT 1984]**
(a) $k = 1$ (b) $k = 2$ (c) $k = 3$ (d) None of these

18. If a root of the given equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ is 1, then the other will be **[RPET 1986]**
(a) $\frac{a(b-c)}{b(c-a)}$ (b) $\frac{b(c-a)}{a(b-c)}$ (c) $\frac{c(a-b)}{a(b-c)}$ (d) None of these

19. In a triangle ABC the value of $\angle A$ is given by $5\cos A + 3 = 0$, then the equation whose roots are $\sin A$ and $\tan A$ will be **[Roorkee 1972]**
(a) $15x^2 - 8x + 16 = 0$ (b) $15x^2 + 8x - 16 = 0$ (c) $15x^2 - 8\sqrt{2}x + 16 = 0$ (d) $15x^2 - 8x - 16 = 0$

20. If one root of the equation $ax^2 + bx + c = 0$ the square of the other, then $a(c-b)^3 = cX$, where X is
(a) $a^3 + b^3$ (b) $(a-b)^3$ (c) $a^3 - b^3$ (d) None of these

21. If 8, 2 are the roots of $x^2 + ax + \beta = 0$ and 3, 3 are the roots of $x^2 + \alpha x + b = 0$, then the roots of $x^2 + ax + b = 0$ are
(a) $8, -1$ (b) $-9, 2$ (c) $-8, -2$ (d) 9, 1 **[EAMCET 1987]**

22. The set of values of x which satisfy $5x + 2 < 3x + 8$ and $\frac{x+2}{x-1} < 4$, is **[EAMCET 1989]**
(a) $(2,3)$ (b) $(-\infty,1)\cup(2,3)$ (c) $(-\infty,1)$ (d) $(1,3)$

23. If α, β are the roots of $x^2 - ax + b = 0$ and if $\alpha^n + \beta^n = V_n$, then **[RPET 1995; Karnataka CET 2000; Pb. CET 2002]**
(a) $V_{n+1} = aV_n + bV_{n-1}$ (b) $V_{n+1} = aV_n + aV_{n-1}$ (c) $V_{n+1} = aV_n - bV_{n-1}$ (d) $V_{n+1} = aV_{n-1} - bV_n$

24. The value of 'c' for which $|\alpha^2 - \beta^2| = \frac{7}{4}$, where α and β are the roots of $2x^2 + 7x + c = 0$, is
(a) 4 (b) 0 (c) 6 (d) 2

25. For what value of λ the sum of the squares of the roots of $x^2 + (2+\lambda)x - \frac{1}{2}(1+\lambda) = 0$ is minimum **[AMU 1999]**
(a) 3/2 (b) 1 (c) 1/2 (d) 11/4

26. The product of all real roots of the equation $x^2 - |x| - 6 = 0$ is **[Roorkee 2000]**
(a) -9 (b) 6 (c) 9 (d) 36

27. For the equation $3x^2 + px + 3 = 0, p > 0$ if one of the root is square of the other, then p is equal to **[IIT Screening 2000]**
(a) $\frac{1}{3}$ (b) 1 (c) 3 (d) $\frac{2}{3}$

28. If α, β be the roots of $x^2 + px + q = 0$ and $\alpha + h, \beta + h$ are the roots of $x^2 + rx + s = 0$, then **[AMU 2001]**
(a) $\frac{p}{r} = \frac{q}{s}$ (b) $2h = \left[\frac{p}{q} + \frac{r}{s}\right]$ (c) $p^2 - 4q = r^2 - 4s$ (d) $pr^2 = qs^2$

29. If $x^2 + px + q = 0$ is the quadratic equation whose roots are $a - 2$ and $b - 2$ where a and b are the roots of $x^2 - 3x + 1 = 0$, then **[Kerala (Engg.) 2002]**
(a) $p = 1, q = 5$ (b) $p = 1, q = -5$ (c) $p = -1, q = 1$ (d) None of these

30. The value of 'a' for which one root of the quadratic equation $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ is twice as large as the other, is **[AIEEE 2003]**
(a) $\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $-\frac{1}{3}$

31. If a, b, c are in G.P., then the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root if $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in **[IIT 1985; Pb. CET 2000; DCE 2000]**
(a) A.P. (b) G.P. (c) H.P. (d) None of these

32. The value of 'a' for which the equations $x^2 - 3x + a = 0$ and $x^2 + ax - 3 = 0$ have a common root is **[Pb. CET 1999]**
(a) 3 (b) 1 (c) -2 (d) 2

33. If $(x+1)$ is a factor of
$x^4 - (p-3)x^3 - (3p-5)x^2 + (2p-7)x + 6$, then $p =$ **[IIT 1975]**
(a) 4 (b) 2 (c) 1 (d) None of these

34. The roots of the equation
$4x^4 - 24x^3 + 57x^2 + 18x - 45 = 0$,
If one of them is $3 + i\sqrt{6}$, are
(a) $3 - i\sqrt{6}, \pm\sqrt{\frac{3}{2}}$ (b) $3 - i\sqrt{6}, \pm\frac{3}{\sqrt{2}}$ (c) $3 - i\sqrt{6}, \pm\frac{\sqrt{3}}{2}$ (d) None of these

35. The values of a for which $2x^2 - 2(2a+1)x + a(a+1) = 0$ may have one root less than a and other root greater than a are given by **[UPSEAT 2001]**
(a) $1 > a > 0$ (b) $-1 < a < 0$ (c) $a \geq 0$ (d) $a > 0$ or $a < -1$

ANSWER KEY(Que. from Compt. Exams)

1	a	2	c	3	c	4	c	5	a
6	a	7	a	8	a	9	d	10	a
11	b	12	b	13	b	14	a	15	a
16	d	17	b	18	c	19	b	20	b
21	d	22	b	23	c	24	c	25	c
26	a	27	c	28	c	29	d	30	a
31	a	32	d	33	a	34	c	35	d
36	d	37	b	38	c	39	a	40	a