LEVEL # 4

Q.1 If the roots of the equation $x^2 - 15 - m(2x-8) = 0$are equal then the value of m will be **[PET-85]**
(1) 3, – 5 (2) –3, 5 (3) 3, 5 (4) –3, – 5

Q.2 If the roots of the equation $ax^2 + bx + c = 0$ reciprocal to each other, then - **[PET-85]**
(1) $a + c = 0$ (2) $b + c = 0$ (3) $a - c = 0$ (4) $b - c = 0$

Q.3 The roots of the equation $x^2 + 2\sqrt{3}x + 3 = 0$ are- **[PET-86]**
(1) Rea & equal (2) Rational & equal (3) Irratonal & equal (4) Irrational & unequal

Q.4 If x be real, then the value of $x^2 - 6x + 13$ is not less than - **[PET-86]**
(1) 4 (2) 5 (3) 6 (4) 8

Q.5 If α, β are roots of $x^2 + x + 1 = 0$ & $\frac{\alpha}{\beta}, \frac{\beta}{\alpha}$ are roots of $x^2 + px + q = 0$ then P equal to -
(1) – 1 (2) 1 (3) – 2 (4) 2 **[PET-87,93]**

Q.6 If one root of the quadratic equation is $\frac{1}{2+\sqrt{5}}$ then the equations is - **[PET-87]**
(1) $x^2 + 4x + 1 = 0$ (2) $x^2 + 4x - 1 = 0$ (3) $x^2 - 4x + 1= 0$ (4) None of these

Q.7 If the roots of the equation $x^2 - 8x + (a^2 - 6a) = 0$ are real than - **[PET-87]**
(1) $-2 \le a \le 8$ (2) $-2 < a < 8$ (3) $2 < a < 8$ (4) $2 \le a \le 8$

Q.8 The quadratic equation with one root $2 + i\sqrt{3}$ is - **[PET-88]**
(1) $x^2 - 4x + 7 = 0$ (2) $x^2 - 4x - 7 = 0$ (3) $x^2 + 4x + 7 = 0$ (4) $x^2 + 4x - 7 = 0$

Q.9 The H.M. of the roots of the equation $x^2 - 8x + 4 = 0$ is - **[PET-88]**
(1) 1 (2) 2 (3) 3 (4) None of these

Q.10 If the roots of the equation $\frac{x^2 - bx}{ax - C} = \frac{m-1}{m+1}$ are equal and of opposite, then m is equal to -
(1) $\frac{a-b}{a+b}$ (2) $\frac{a+b}{a-b}$ (3) $\frac{a}{a+b}$ (4) $\frac{b}{a+b}$ **[PET-88]**

Q.11 If l, m, n are real and $l \neq m$, the roots of the equation $(l - m)x^2 - 5(l - m)x - 2(l - m) = 0$ are-
(1) Real & equal (2) Complex (3) Real & unequal (4) None **[PET-88]**

Q.12 If α, β are roots of $x^2 + ax + b = 0$ then $\alpha^3 + \beta^3$ equal to - **[PET-89, 96]**

(1) $a^3 + 3ab$ (2) $-a^3 + 3ab$ (3) $-(a^3 + 3ab)$ (4) None of these

Q.13 If a non zero root of $x^2 + 2x + 3\lambda = 0$ and $2x^2 + 3x + 5\lambda = 0$ is common then λ equal to -

(1) 2 (2) 1 (3) -1 (4) -2 **[PET-89]**

Q.14 If α, β are roots of $4x^2 + 3x + 7 = 0$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ equal to - **[PET-90]**

(1) 3/7 (2) $-3/7$ (3) 7/3 (4) $-7/3$

Q.15 If $x^2 + 2xy + 2x + my - 3$ have 2 rational factors then m equal to - **[PET-90]**

(1) 6, 2 (2) -2, 6 (3) 6, -2 (4) -2, -6

Q.16 If α, β be roots of the equation $ax^2 + bx + c = 0$ then the equation whose roots are

$\alpha + \frac{1}{\beta}$ and $\beta + \frac{1}{\alpha}$ will be - **[PET-91]**

(1) $acx^2 + b(c + a)x + (c + a)^2$ (2) $acx^2 - b(c + a)x + (c + a)^2 = 0$

(3) $acx^2 + b(c + a)x - (c + a)^2$ (4) None of these

Q.17 If subtraction of roots of $x^2 - lx + m = 0$ is one then - **[PET-91]**

(1) $l^2 + 4m = 1$ (2) $l^2 - 4m = 1$ (3) $l^2 + 4m + 1 = 0$ (4) $l^2 - 4m + 1 = 0$

Q.18 Find the quadraic equation whose one root is $7 + 5i$ **[PET-92]**

(1) $x^2 - 14x - 74 = 0$ (2) $x^2 + 14x + 74 = 0$ (3) $x^2 + 14x - 74 = 0$ (4) $x^2 - 14x + 74 = 0$

Q.19 Find the real roots of the equation $|x^2 - x - 6| = x + 2$ **[PET-92]**

(1) 4, 2, -2 (2) 3, 2, -2 (3) 4, 2, -3 (4) 4, 3, -2

Q.20 If $\frac{-i + \sqrt{3}}{2}$ is a root of a quadratic equation, then the sum of its roots equal to- **[PET-93]**

(1) $\frac{\sqrt{3}}{2}$ (2) $\sqrt{3}$ (3) i (4) $-i$

Q.21 If α, β are the roots of the equation $ax^2 + bx + c = 0$ then equation with roots $\frac{1}{\alpha}, \frac{1}{\beta}$ will be-

(1) $cx^2 - bx + a = 0$ (2) $cx^2 + bx + a = 0$ (3) $x^2 + bx + a = 0$ (4) $x^2 + bx - a = 0$

[PET-93]

Q.22 If the roots of the equation $x^2 + x + 1 = 0$ are in the ratio m : n then - **[PET-94]**

(1) $\sqrt{\frac{m}{n}} + \sqrt{\frac{n}{m}} + 1 = 0$ (2) $\sqrt{m} + \sqrt{n} + 1 = 0$ (3) $\frac{m}{n} + \frac{n}{m} + 1$ (4) $m + n + 1 = 0$

Q.23 If the roots of the equation $x^2 + px + q = 0$ are obtained – 2 and – 15. Where the coefficient roots of x was misread 17 in place of 13, the correct roots of the equation are - **[PET-94]**

(1) –10, –3 (2) 10, 3 (3) –10, 3 (4) 10, – 3

Q.24 The roots of equation $\frac{2x+31}{9} + \frac{x^2+7}{x^2-7} = \frac{2x+47}{9}$ are - **[PET-94]**

(1) 3, – 3 (2) 5, – 5 (3) $\sqrt{3}, -\sqrt{3}$ (4) $\sqrt{5}, -\sqrt{5}$

Q.25 If α, β are the roots of equation $x^2 - ax + b = 0$ and $V_n = \alpha^n + \beta^n$ then which statement is true- **[PET-95]**

(1) $V_{n+1} = aV_n - bV_{n-i}$ (2) $V_{n-1} = bV_n - aV_{n-1}$ (3) $V_{n+1} = bV_n - aV_{n-1}$ (4) $V_n = V_{n+1} - bV_{n-1}$

Q.26 If the roots of the equation $5x^2 + 13x + k = 0$ are α and $\frac{1}{\alpha}$ then value of k is - **[PET-95]**

(1) –2/5 (2) –5/2 (3) –5 (4) 5

Q.27 If $x = 2 + 2^{1/3} + 2^{2/3}$, then the values of $x^3 - 6x^2 + 6x$ is – **[PET-95]**

(1) –2 (2) 3 (3) 4 (4) 2

Q.28 If α, β be roots of $x^2 - (1 + n^2)x + (1 + n^2 + n^4) = 0$ then $\alpha^2 + \beta^2$ equal to - **[PET-96]**

(1) 2n (2) n^3 (3) n^2 (4) $2n^2$

Q.29 If α, β be roots of $x^2 + x + 1 = 0$ then the equation whose roots are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ will be **[PET-96]**

(1) $x^2 + x = 1$ (2) $x^2 - x = 1$ (3) $x^2 - x + 1 = 0$ (4) $x^2 + x + 1 = 0$

Q.30 In one roots of the equation $x^2 + px + q = 0$ and $x^2 + p'x + q^2 = 0$ ($p \neq p'$ and $q \neq q'$) is common, then root is - **[PET-97]**

(1) $\frac{q-q'}{p-p'}$ (2) $\frac{pq'-p'q}{q-q'}$ (3) $\frac{q-q'}{p'-p}$ or $\frac{pq'-p'q}{q-q'}$ (4) $\frac{q-q'}{p-p'}$ or $\frac{pq-p'q'}{q-q'}$

Q.31 If the roots of the equation $\ell x^2 + mx + n = 0$ are in the ratio p : q then $\sqrt{\frac{p}{q}} + \sqrt{\frac{q}{p}} + \sqrt{\frac{n}{\ell}}$ equal to -

(1) $\frac{p+q}{\ell}$ (2) $\frac{p}{q} \cdot \frac{n}{\ell}$ (3) 0 (4) None **[PET-97]**

Q.32 If the roots of the equation $x^2 - 8x + a^2 - 6a = 0$ are real then the value of a will be **[PET-97]**
(1) $-2 \le a \le 8$ (2) $-2 < a < 8$ (3) $2 < a < 8$ (4) $2 \le a \le 8$

Q.33 If x be real, then the minimum value of the expression $\frac{1 - x + x^2}{1 + x + x^2}$ will be - **[PET-97]**
(1) 0 (2) 1 (3) 1/3 (4) 3

Q.34 If the roots of the equation $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ are equal then a, b, c, will be in –
(1) A.P. (2) G.P. (3) H.P. (4) None **[PET-97]**

Q.35 If α, β are the roots of the equation $x^2 - 2x \cos 2q + 1 = 0$ then the equation whose roots are $\alpha^{n/2}$, $\beta^{n/2}$ will be - **[PET-98]**
(1) $x^2 - 2nx \cos \theta/2 + 1 = 0$ (2) $x^2 + 2nx \cos \theta/2 + 1 = 0$
(3) $x^2 + 2x \cos\left(\frac{n\theta}{2}\right) + 1 = 0$ (4) $x^2 - 2x \cos\left(\frac{n\theta}{2}\right) + 1 = 0$

Q.36 If one root of the equation $ax^2 - bx + c = 0$ is square of the other, then - **[PET-98]**
(1) $a^2c + ac^2 - b^3 + 3abc = 0$ (2) $a^2c + ac^2 + b^3 = 3abc$
(3) $a^2c - ac^2 - b^3 + 3abc = 0$ (4) None of these

Q.37 If x be real, the value of the expression $\frac{x^2 + 14x + 9}{x^2 + 2x + 3}$ will lies - **[PET-98]**
(1) between 5 and 4 (2) between 5 and – 4 (3) between–5 and 4 (4) None of these

Q.38 If α, β are roots of the equation $x^2 - 5x - 3 = 0$, then the equation whose roots are $\frac{1}{2\alpha - 3}, \frac{1}{2\beta - 3}$ will be - **[PET-98]**
(1) $33x^2 + 4x - 1 = 0$ (2) $33x^2 - 4x + 1 = 0$ (3) $33x^2 - 4x - 1 = 0$ (4) None of these

Q.39 If α, β are roots of the equation $x^2 - 3x + 1 = 0$ then the equation with roots $\frac{1}{\alpha - 2}, \frac{1}{\beta - 2}$ will be-
(1) $x^2 - x - 1 = 0$ (2) $x^2 + x - 1 = 0$ (3) $x^2 + x + 1 = 0$ (4) None **[PET-99]**

Q.40 If $a = \frac{\cos 2\pi}{7} + \frac{i \sin 2\pi}{7}$. Then quadratic equation whose roots are $\alpha = a + a^2 + a^4$ and $\beta = a^3 + a^5 + a^6$ is- **[PET-2000]**
(1) $x^2 - x + 2 = 0$ (2) $x^2 + x - 2 = 0$ (3) $x^2 + x + 2 = 0$ (4) $x^2 - x - 2 = 0$.

Q.41 If roots of the equation $12x^2 + mx + 5 = 0$ are in ratio 2 : 3 them m = **[PET-2002]**
(1) $5\sqrt{10}$ (2) $3\sqrt{10}$ (3) $2\sqrt{10}$ (4) None of these

Q.42 If a, b, c are in G.P. then the equation $ax^2 + 2bx + c = 0$ & $dx^2 + 2ex + f = 0$ have common root if $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in- **[IIT-85]**

(1) AP (2) GP (3) HP (4) None of these

Q.43 If one root of the equation $x^2 + bx + a = 0$ & $x^2 + ax + b = 0$ is common and $a \neq b$ then- **[IIT-86]**

(1) $a + b = 0$ (2) $a + b = -1$ (3) $a - b = 1$ (4) $a + b = 1$

Q.44 If $a \leq 0$, then roots of $x^2 - 2a\,|x - a| - 3a^2 = 0$ is- **[IIT-86]**

(1) $(-1 + \sqrt{6})\,a$ (2) $(\sqrt{6} - 1)\,a$ (3) a (4) None of these

Q.45 If a, b, c are distinct positive number such that b+ c – a, c + a – b and a + b – c are positive then the expression (b + c – a) (c + a – b) (a + b – c) – abc is- **[IIT-86]**

(1) Positive (2) Negative (3) Non positive (4) Non negative

Q.46 If S is the set of all real x such that $2x - \frac{1}{2x^3 + 3x^2 + x}$ is positive, then S contains- **[IIT-86]**

(1) $\left(-\infty, -\frac{3}{2}\right)$ (2) $\left(-\frac{3}{2}, -\frac{1}{4}\right)$

(3) $\left(-\frac{1}{4}, \frac{1}{2}\right)$ (4) $(-\infty, -1) \cup (-1/2, 0) \cup (1/2, \infty)$

Q.47 If α_1, α_2 & β_1, β_2 are roots of the equation $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$ respectively and a non zero solution of the systems of equation $\alpha_1 y + \alpha_2 z = 0$ exist then- **[IIT-87]**

(1) $p^2 br = a^2 qc$ (2) $b^2 pr = q^2 ac$ (3) $r^2 pb = c^2 ar$ (4) None of these

Q.48 If α and β are the roots of $x^2 + px + q = 0$ and $\alpha^4 . \beta^4$ are the roots of $x^2 - rx + 5 = 0$, then the equation $x^2 - 4qx + 2q^2 - r = 0$ has always - **[IIT-89]**

(1) Two real roots (2) Two negative roots

(3) Two positive roots (4) One positive and one negative root

Q.49 Let a, b, c be real numbers $a \neq b$. If α is a root of $a^2x^2 + bx + c = 0$, β is a root of $a^2x^2 - bx - c = 0$ and $0 < \alpha < \beta$, then the equation $ax^2 + 2bx + 2c = 0$ has a root γ that always satisfies-

(1) $\gamma = 1/2\,(\alpha + \beta)$ (2) $\gamma = \alpha + 1/2\,\beta$

(3) $\gamma = \alpha$ (4) $\alpha < \gamma < \beta$ **[IIT-89]**

Q.50 If the roots of the equation $(\cos p - 1)\,x^2 + (\cos p)\,x + \sin p = 0$. (x is variable) real then **[IIT-90]**

(1) $p \in (0, 2\pi)$ (2) $p \in (-\pi, 0)$ (3) $p \in (\pi/2, \pi/2)$ (4) $p \in (0, \pi)$

Q.51 If f(x) be a quadratic equation such that all the values of x, f(x) be positive & g(x) = f(x) + f'(x) + f"(x) then for any real x - **[IIT-90]**

(1) $g(x) < 0$ (2) $g(x) > 0$ (3) $g(x) = 0$ (4) $g(x) \geq 0$

Q.52 If $f(x) = 2x^3 + mx^2 - 13x + n$ and 2, 3 are roots of the equation f(x) = 0 , then the value of m and n are - **[REE-90]**

(1) – 5, – 30 (2) – 5, 30 (3) 5, 30 (4) None of these

Q.53 $7^{\log_7(x^2-4x+5)} = x - 1$, x may have values- **[REE Screening-90]**

(1) 2, 3 (2) 7 (3) – 2, – 3 (4) 2, – 3

Q.54 If expression $\{(\sin^2 x + \sin^4 x + \sin^6 x + \ldots\ldots\ldots\infty) \ln 2\}$ satisfies the equation $x^2 - 9x + 8 = 0$, find the value of $\frac{\cos x}{\cos x + \sin x}$, $0 < x < \frac{\pi}{2}$ - **[IIT-91]**

(1) $\frac{1}{1+\sqrt{3}}$ (2) $\frac{1}{1-\sqrt{3}}$ (3) $\frac{2}{1-\sqrt{2}}$ (4) None of these

Q.55 If the roots of the equation (x – a) (x – b) – k = 0 be c and d then find the equation whose roots are a and b- **[IIT-92]**

(1) (x – c) (x – d) + k = 0 (2) (x + c) (x – a) + k = 0

(3) (x – c) + (x – a) = 0 (4) None of these

Q.56 The set of values of p for which the roots of the equation $3x^2 + 2x + p(p - 1) = 0$ are of opposite sign is- **[IIT-92]**

(1) $(-\infty, 0)$ (2) (0, 1) (3) $(1, \infty)$ (4) $(0, \infty)$

Q.57 If the two equations $a_1x^2 + b_1x + c_1 = 0$ and $a_2x^2 + b_2x + c_2 = 0$ have a common root then the value of $(a_1b_2 - a_2b_1)(b_1c_2 - b_2c_1)$ is- **[REE-92]**

(1) $-(a_1c_2 - c_1a_2)^2$ (2) $(a_1a_2 - c_1c_2)^2$ (3) $(a_1c_1 - a_2c_2)^2$ (4) $(a_1c_2 - c_1a^2)^2$

Q.58 The value of p for which the difference between the roots of the equation $x^2 + px + 8 = 0$ is 2 are- **[REE screening-92]**

(1) ± 2 (2) ±4 (3) ± 6 (4) ± 8

Q.59 The root of the equation $a(b - c)x^2 + b(c - a)x + c(a - b) = 0$ are equal, then a, b, c are in- **[REE screening-93]**

(1) HP (2) GP (3) AP (4) None of these

Q.60 Let α and β be the roots of the equation $x^2 + x + 1 = 0$. The equation whose roots are α^{19} β^7 is- **[IIT screening-94]**

(1) $x^2 - x - 1 = 0$ (2) $x^2 - x + 1 = 0$ (3) $x^2 + x - 1 = 0$ (4) $x^2 + x + 1 = 0$

Q.61 Let a, b, c be real. If $ax^2 + bx + c = 0$ has two real root α and β under $\alpha < -1$ and $\beta > 1$, then $1 + \frac{c}{a} + \left|\frac{b}{a}\right|$ is- **[iit Screening-94]**

(1) 1 (2) 2 (3) 0 (4) 4

Q.62 The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is- **[IIT-98]**

(1) 0 (2) 5 (3) 6 (4) 10

Q.63 If roots of the equation $x^2 - 2ax + a^2 + a - 3 = 0$ are real and less than 3, then- **[IIT-99]**

(1) $a < 2$ (2) $2 \le a \le 3$ (3) $3 < a \le 4$ (4) $a > 4$

Q.64 In Δ PQR, $\angle R = \pi/2$. If tan (P/2) and tan (Q/2) are roots of the equation $ax^2 + bx + c = 0$ $(a \ne 0)$, then- **[IIT-99]**

(1) $a + b = c$ (2) $b + c = a$ (3) $c + a = b$ (4) $b = c$

Q.65 If α, β $(\alpha < \beta)$ are roots of the equation $x^2 + bx + c = 0$ where $c < 0 < b$, then- **[IIT Scr-2000]**

(1) $0 < \alpha < \beta$ (2) $\alpha < 0 < \beta < |\alpha|$ (3) $\alpha < \beta < 0$ (4) $\alpha < 0 < |\alpha| < \beta$

Q.66 If one root of the equation $3x^2 + px + 3 = 0$, $p > 0$ is square of the other then the value of p is- **[IIT Scr-2000]**

(1) 1/3 (2) 1 (3) 3 (4) 2/3

Q.67 If $b > a$, then for roots of the equation $(x - a)(x - b) - 1 = 0$- **[IIT Scr-2000]**

(1) Both roots are in [a, b] (2) Both roots are in $(-\infty, a)$

(3) Both roots are in (b, ∞) (4) One root is in $(-\infty, a)$ and other in (b, ∞)

Q.68 The set of all real numbers x for which $x^2 - |x + 2| + x > 0$, is- **[IIT Scr-2001]**

(1) $(-\infty, -2) \cup (2, \infty)$ (2) $\left(-\infty, -\sqrt{2}\right) \cup \left(\sqrt{2}, \infty\right)$

(3) $(-\infty, -1) \cup (1, \infty)$ (4) $\left(\sqrt{2}, \infty\right)$

Q.69 Let α, β be the roots of $x^2 - x + p = 0$ and γ, δ be the roots of $x^2 - 4x + q = 0$. If $\alpha, \beta, \gamma, \delta$ are in G.P., then the integeral values of p and q respectively, are - **[IIT Sc.-2001]**

(1) –2, –32 (2) –2, 3 (3) –, 3 (4) –6, –32

Q.70 The set of all real numbers x for which $x^2 - |x + 2| + x > 0$, is **[IIT Sc.-2002]**

(1) $(-\infty, -2) \cup (2, \infty)$ (2) $(-\infty, -\sqrt{2}) \cup (\sqrt{2}, \infty)$ (3) $(-\infty, -1) \cup (1, \infty)$ (4) $(\sqrt{2}, \infty)$

Q.71 If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3$ and $\beta^2 = 5\beta - 3$ then the equation having $\frac{\alpha}{b}$ and $\frac{\beta}{\alpha}$ as its root is **[AIEEE-2000]**

(1) $3x^2 - 19x + 3 = 0$ (2) $3x^2 + 19x - 3 = 0$ (3) $3x^2 - 19x - 3 = 0$ (4) $x^2 - 5x + 3 = 0$

Q.72 Product of real roots of the equation $t^2x^2 + |x| + 9 = 0$ **[AIEEE-2000]**

(1) is always positive (2) is always negative (3) does not exist (4) none of these

Q.73 If p and q are the roots of the equation $x^2 + px + q = 0$, then **[AIEEE-2000]**

(1) $p = 1, q = -2$ (2) $p = 0, q = 1$ (3) $p = -2, q = 0$ (4) $p = -2, q = 1$

Q.74 The number of real solution of the equation $x^2 - 3|x| + 2 = 0$ is **[AIEEE-2003]**

(1) 3 (2) 2 (3) 4 (4) 1

Q.75 If $(1 - p)$ is a root of quadratic equation $x^2 + px + (1 - p) = 0$ then its roots are- **[AIEEE-2004]**

(1) $-1, 2$ (2) $-1, 1$ (3) $0, -1$ (4) $0, 1$

Q.76 If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, then the value of 'q' is **[AIEEE-2004]**

(1) 4 (2) 12 (3) 3 (4) $\frac{49}{4}$

Q.77 If $2a + 3b + 6C = 0$, then at least one root of the equation $ax^2 + bx + c = 0$ lies in the interval

(1) (1, 3) (2) (1 2) (3) (2, 3) (4) (0, 1) **[AIEEE-2004]**

Q.78 The value of a for which the sum of the squares of the roots of the equation $x^2 - (a - 2)x - a - 1 = 0$ assume the least value is **[AIEEE-2005]**

(1) 1 (2) 0 (3) 3 (4) 2

Q.79 If the roots of the equation $x^2 - bx + c = 0$ be two consecutive integers then $b^2 - 4ac$ equals **[AIEEE-2005]**

(1) -2 (2) 3 (3) 2 (4) 1

Q.80 If both 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]**

(1) $(5, 6]$ (2) $(6, \infty)$ (3) $(-\infty, 4)$ (4) $[4, 5)$