Q.1 If α, β are the root of a quadratic equation $x^2 - 3x + 5 = 0$ then the equation whose roots are $(\alpha^2 - 3\alpha + 7)$ and $(\beta^2 - 3\beta + 7)$ is
(A) $x^2 + 4x + 1 = 0$ (B) $x^2 - 4x + 4 = 0$
(C) $x^2 - 4x - 1 = 0$ (D) $x^2 + 2x + 3 = 0$

Q.2 If α, β are root of the equation $x^2 - 5x + 6 = 0$ then the equation whose roots are $\alpha + 3$ and $\beta + 3$ is
(A) $x^2 - 11x + 30 = 0$ (B) $(x-3)^2 - 5(x-3) + 6 = 0$
(C) Both (A) and (B) (D) none

Q.3 If a, p, q are non-zero real numbers, the two equations $2a^2x^2 - 2abx + b^2 = 0$ and $p^2x^2 + 3pqx + q^2 = 0$ have
(A) No common root
(B) One common root if $2a^2 + b^2 = p^2 + q^2$
(C) Two common roots if $3pq = 2ab$
(D) Two common roots iff $3qb = 2ap$

Q.4 If $a > b > 0$ are two real numbers, the value of
$\sqrt{ab + (a-b)\sqrt{ab + (a-b)\sqrt{ab + (a-b)\sqrt{ab + \ldots}}}}$ is
(A) Independent of b (B) Independent of a
(C) Independent of both A and B
(D) Dependent on both A and B

Q.5 The equation $x^2 + (1 + 2\sin\theta)x + \sin 2\theta(\sin\theta - \cos\theta) = 0$ has roots of equal magnitude but opposite signs for
(A) Only one value of θ (B) Only two values of θ
(C) Infinitely many values of θ (D) No value of θ

Q.6 The number of solutions of the equation $4x(x-3) - 5|2x-3| + 13 = 0$ is
(A) 1 (B) 2 (C) 3 (D) 4

Q.7 The quadratic expression $21 + 12x - 4x^2$ are
(A) The least value 5 (B) The highest value 30
(C) The highest value 21 (D) None of these

Q.8 The roots of $x^2 - 8|x| + 12 = 0$
(A) Do not form a progression
(B) Form an A..P. with Zero sum
(C) Form an A.P. with non-zero sum
(D) Form a G.P.

Q.9 The quadratic equation with real coefficients one of whose complex roots has the real part 12 and modulus 13 is
(A) $x^2 - 12x + 13 = 0$ (B) $x^2 - 24x + 13 = 0$
(C) $x^2 - 24x + 169 = 0$ (D) $x^2 - 24x - 13 = 0$

Q.10 The quadratic equation $(3 + \sin\theta)x^2 + (2\cos\theta)x + 2 - \sin\theta = 0$ has
(A) Equal roots for all θ
(B) Real and distinct roots for all θ
(C) Complex roots for all θ
(D) Real or complex roots depending upon θ

Q.11 If a, b, c are real and $a \neq b$, then the roots of the equation $2(a-b)x^2 - 11(a+b+c)x - 3(a-b) = 0$ are –
(A) real and equal (B) real and unequal
(C) purely imaginary (D) none of these

Q.12 The quadratic expression $21 + 12x - 4x^2$ takes –
(A) the least value 5 (B) the greatest value 30
(C) the greatest value 21 (D) none of these

Q.13 If $\sin^x\theta + \cos^x\theta \geq 1$, $0 < \theta < \pi/2$, then –
(A) $x \in (-\infty, 2]$ (B) $x \in [-2, 2]$
(C) $x \in [-1, 1]$ (D) $x \in [2, \infty]$

Q.14 The number of positive terms in the expansion of $(1 - 2x + x^2)^n (1 + x + x^2)^{2n}$. $x > 0$ and $n \in N$ is
(A) n (B) $n + 1$
(C) $2n + 1$ (D) $(n+1)(2n+1)$

Q.15 If $\sin x + \cos x = \sqrt{y + \frac{1}{y}}$, $x \in [0, \pi]$, then
(A) $x = \pi/4$ (B) $x = \pi/2$
(C) $x = \pi/$ (D) $x = 3\pi/4$

Q.16 The inequalities $y(-1) \geq -4$, $y(1) \leq 0$ and $y(3) \geq 5$ are known to hold for $y = ax^2 + bx + c$ then the least value of 'a' is
(A) $-1/4$ (B) $-1/3$
(C) 1/4 (D) 1/8

Q.17 If the roots of the equation, $\frac{1}{x+p}+\frac{1}{x+q}=\frac{1}{r}$ are equal in magnitude but opposite in sign then $p+q$ is equal to
(A) r (B) 2r
(C) (1/2)r (D) none of these

Q.18 The roots of the equation $x^2-2\sqrt{2}x+1=0$ are **(2010)**
(A) Real and different (B) Imaginary and different
(C) Real and equal (D) Rational and different

Q.19 If p and q are roots of the equation $x^2-2x+A=0$ and r and s be roots of the equation $x^2-18x+B=0$ if $p<q<r<s$ be in A.P., then A and B are respectively –
(A) $-3, 77$ (B) $3, 77$
(C) $3, -77$ (D) none of these

Q.20 If the roots of equation $x^2+bx+ac=0$ are α, β and roots of the equation $x^2+ax+bc=0$ are α, γ then the value of α, β, λ respectively -
(A) a, b, c (B) b, c, a
(C) c, a, b (D) none of these

Q.21 If the quadratic equations $ax^2+2cx+b=0$ and $ax^2+2bx+c=0$ $(b\neq c)$ have a common root, then $a+4b+4c$ is equal to –
(A) -2 (B) -1
(C) 0 (D) 1

Q.22 The value of m for which one of the roots of $x^2-3x+2m=0$ is double of one of the roots of $x^2-x+m=0$ is
(A) 0, 2 (B) 0, -2
(C) 2, -2 (D) none of these

Q.23 If the expression $x^2-11x+a$ and $x^2-14x+2a$ must have a common factor and $a\neq 0$, then, the common factor is – **(2009)**
(A) $(x-3)$ (B) $(x-6)$
(C) $(x-8)$ (D) none of these

Q.24 If the roots of the equation $x^2+3x+2=0$ and $x^2-x+\lambda=0$ are in same ratio then the value of λ is given by-
(A) 2/7 (B) 2/9
(C) 9/2 (D) 7/2

Q.25 The sum of all real roots of the equation $|x-2|^2+|x-2|-2=0$, is -
(A) 0 (B) 8
(C) 4 (D) none of these

Q.26 The minimum value of $f(x)=x^2-2bx+2c^2$ is more than the maximum value of $g(x)=-x^2-2cx+b^2$, x being real, for–
(A) $|c|<|b|\sqrt{2}$ (B) $0<c<b\sqrt{2}$
(C) $|c|>|b|\sqrt{2}$ (D) $b\sqrt{2}<c<0$

Q.27 If the roots of $x^2-bx+c=0$ are two consecutive integers, then b^2-4c is –
(A) 0 (B) 2 (C) 3 (D) 1

Q.28 If a, b, c are non-zero real numbers, then two equations $2a^2x^2-2abx+x^2=0$ and $ax^2+bx-c^2=0$ have –
(A) no common root (B) two common roots
(C) one common root if $a>0$ (D) no common root if $a>0$

Q.29 Let $a, b, c \in R$ and $ax^2+bx+c=0$ has two negative roots, then – **(2008)**
(A) a, b, c are of same sign (B) a, –b, c are of same sign
(C) a, b, –c are of same sign (D) a, – c are of same sign

Q.30 The equation $\pi^x=-2x^2+6x-9$ has –
(A) one solution (B) two solutions
(C) infinite solutions (D) no solution

Q.31 Number of integral values of x satisfying the inequality $\left(3^{\frac{5}{2}\log_3(12-3x)}\right)-\left(3^{\log_2 x}\right)>32$ are .....
(A) 2 (B) 6 (C) 8 (D) 10

Q.32 $\frac{8x^2+16x-51}{(2x-3)(x+4)}>3$, if x satisfies
(A) $x<-4$ (B) $-3<x<3/2$
(C) $x>5/2$ (D) all the above

Q.33 Number of solution for the system of inequalities
$\begin{cases}2x+1<x+2,\\ x-1>2x\end{cases}$ **(2007)**
(A) 1 (B) 2 (C) 3 (D) 0

Q.34 Solution for the system of inequalities : $\begin{cases}x^2-3x+2\geq 0\\ x-x^2+2\geq 0\end{cases}$
(A) $[-1, 1]\cup\{2\}$ (B) $[1, 1]\cup\{2\}$
(C) $[1, -1]\cup\{2\}$ (D) $[-1, -1]\cup\{2\}$