QUADRATIC EQUATIONS

Single Correct Answer Type:

1. If $0 \le x \le 1000$ and $\left[\frac{x}{2}\right]+\left[\frac{x}{3}\right]+\left[\frac{x}{5}\right]=\frac{31}{30}x$, where $[x]$ denotes greatest integer function, then possible number of values of x is
(A) 31 (B) 32 (C) 33 (D) 34

2. The set of exhaustive values of a for which the equation $|ax-2| = 2x^2+ax+4$ has at least one positive roots is
(A) $(-\infty, 0]$ (B) $(-\infty, -2]$ (C) $(-\infty, -2] \cup [2, \infty)$ (D) $[2, \infty)$

3. The equation $a_8x^8 + a_7x^7 + a_6x^6 + ... + a_0 = 0$ has all its roots positive and real
(where $a_8 = 1, a_7 = -4, a_0 = \frac{1}{2^8}$), then
(A) $a_1 = \frac{1}{2^8}$ (B) $a_1 = \frac{1}{2^4}$ (C) $a_2 = \frac{7}{2^4}$ (D) $a_2 = \frac{7}{2^4}$

4. Suppose a cubic polynomial $f(x) = x^3 + px^2 + qx + 72$ is divisible by both x^2+ax+b and x^2+bx+a (where a, b, p, q are constants and $(a \ne b)$. Find the sum of the squares of the roots of the cubic polynomial
(A) 146 (B) 144 (C) 140 (D) 136

5. If $0 < a < b < c$, and the roots α, β of the equation $ax^2+bx+c=0$ are imaginary, then
(A) $|\alpha| \ne |\beta|$ (B) $|\alpha| > 1$ (C) $|\beta| < 1$ (D) $a = |\beta|$

6. The value(s) of 'p' for which the equation $ax^2 - px + ab = 0$ and $x^2 - ax - bx + ab = 0$ may have a common root, given a, b are non zero real numbers, is
(A) a^2+b^2 (B) $a(1+b)$ (C) $ab(1+b)$ (D) $b(1+a)$

7. If $\tan\theta_1, \tan\theta_2, \tan\theta_3$ and $\tan\theta_4$ are the roots of the equation $x^4 - x^3\sin 2\beta + x^2\cos 2\beta - x\cos\beta - \sin\beta = 0$ then $\tan(\theta_1+\theta_2+\theta_3+\theta_4)$
(A) $\cot\beta$ (B) $\sin\beta$ (C) $\tan\beta$ (D) $\cos\beta$

8. If $x^2+5 = 2x - 4\cos(a+bx)$, where $a, b \in (0,5)$, is satisfied for atleast one real x, then the maximum value of $a+b$ is equal to
(A) 3π (B) 2π (C) π (D) None of these

9. The value of '$|x|$' satisfying the equation $x^4 - 2\left(x\sin\left(\frac{\pi}{2}x\right)\right)^2 + 1 = 0$
(A) 1 (B) 2 (C) 0 (D) No value of 'x'

10. The equation $(a+2)x^2 + (a-3)x = 2a-1$, $a \ne -2$ has rational roots for
(A) All rational values of a except $a = -2$ (B) All real values of a except $a = -2$
(C) Rational values of $a > \frac{1}{2}$ (D) None of these

11. Find the value of x satisfying the equation $\left|\left|\left|x^2-x+4\right|-2\right|-3\right|=x^2+x-12$

(A) 11 (B) 22 (C) $\frac{11}{2}$ (D) $\frac{11}{4}$

12. The value of m for which will $2x^2+mxy+3y^2-5y-2$ can be split into two factors is

(A) ±7 (B) ±2 (C) 0 (D) ±5

13. If each pair of the equation $x^2+ax+b=0$, $x^2+bx+c=0$ and $x^2+cx+a=0$ has common root, then product of all common root is

(A) $\sqrt{abc}$ (B) $2\sqrt{abc}$ (C) $\sqrt{ab+bc+ca}$ (D) $2\sqrt{ab+bc+ca}$

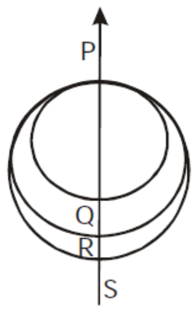
14. If α,β are roots of $x^2+x+1=0$, then the value of $\lim\limits_{n\to\infty}\sum_{r=1}^{n}\left(\alpha^r+\beta^r\right)$ is

(A) 0 (B) 1 (C) 2 (D) 3

15. PQRS is a common diameter of three circles. The area of the middle circle is the average of the other two. If $PQ=2$ and $RS=1$, then the length of QR is

(A) $\sqrt{6}+1$ (B) $\sqrt{6}-1$

(C) 5 (D) 4



16. Let f be a continuous function defined on $[-2009,2009]$ such that $f(x)$ is irrational for each $x\in[-2009,2009]$ and $f(0)=2+\sqrt{3}+\sqrt{5}$. The equation $f(2009)x^2+2f(0)x+f(2009)=0$ has

(A) Only rational roots (B) Only irrational roots (C) One rational and one irrational root (D) Imaginary roots

17. Find x if $4^x+6^x=9^x$

(A) $\frac{\ln\left(\sqrt{5}-1\right)+\log 2}{\ln 2-\ln 3}$ (B) $\frac{\ln\left(\sqrt{5}-1\right)+2\ln 2}{\ln 2-\ln 3}$ (C) $\frac{\ln\left(\sqrt{5}-1\right)-\ln 2}{\ln 2-\ln 3}$ (D) $\frac{\ln\left(\sqrt{5}-1\right)+\ln 2}{\ln 3-\ln 2}$

18. Given that β_1,β_2 be roots of the equation $x^2-6x+p=0$, β_3,β_4 are the roots of the equation $x^2-54x+q=0$ and $\beta_1,\beta_2,\beta_3,\beta_4$ form an increasing G.P, then sum of the digits of $q-p$ is

(A) 6 (B) 7 (C) 8 (D) 9

19. If a, b, c are in H.P., then the equation $a(b-c)x^2+b(c-a)x+c(a-b)=0$

(A) has real and distinct roots (B) has equal roots and each is equal to one

(C) has no real root (D) has 0 as a root

20. If $a\in R$ and the equation $(a-2)(x-[x])^2+2(x-[x])+a^2=0$ (which [x] denotes G.I.F) has no integral solution and has exactly one solution in $(2,3)$ then a lies in the interval

(A) $(0,1)$ (B) $(1,2)$ (C) $(-1,3)$ (D) $(-1,0)$

Numerical Based:

21. A quadratic equation with integral coefficients has two prime numbers as its roots. If the sum of the coefficients of the equation is prime, then the sum of the roots is

22. If the polynomial $f(x)=1-x+x^2-x^3....-x^{19}+x^{20}$ is expressed as

$g(y)=a_0+a_1y+a_2y^2+....+a_{20}y^{20}$ where $y=x-4$ and the value of $a_0+a_1+a_2+....+a_{20}$ is $\frac{5^{k_1}+k_2}{k_3}$, then the value of $k_1+k_2+k_3$ is

23. The number of values of triplets (a,b,c) for which $a\cos 2x+b\sin^2 x+c=0$ is an identity

24. Consider the equation $x^2+2x-n=0$, where $n\in N$ and $n\in[5,100]$. Total number of different values of 'n' so that the given equation has integral roots is

25. Let α,β be the roots of $(x-2)(x-3)+(x-3)(x+1)+(x+1)(x-2)=0$, then find the value of $\frac{1}{(\alpha+1)(\beta+1)}+\frac{1}{(\alpha-2)(\beta-2)}+\frac{1}{(\alpha-3)(\beta-3)}$ ______

KEY

1.	D	2.	B	3.	B	4.	A	5.	B
6.	B	7.	A	8.	A	9.	A	10.	A
11.	C	12.	A	13.	A	14.	B	15.	B
16.	A	17.	C	18.	D	19.	B	20.	D
21.	5	22.	28	23.	1	24.	8	25.	0

❇ *Wish You all the Best* ❇