TRIGONOMETRIC EQUATIONS

Single Correct Answer Type

1. If $\cos 3x + \sin\left(2x - \frac{7\pi}{6}\right) = -2$, then x is

(A) $(6n+1)\frac{\pi}{3},\ n \in \mathbb{Z}$ (B) $(6n-1)\frac{\pi}{3},\ n \in \mathbb{Z}$ (C) $(2n+1)\frac{\pi}{3},\ n \in \mathbb{Z}$ (D) None

2. If $1 - \sin 2x = \cos x - \sin x$, then x is

(A) $2n\pi, \left(2n\pi - \frac{\pi}{2}\right),\ n \in \mathbb{Z}$ (B) $2n\pi, \left(n\pi + \frac{\pi}{4}\right),\ n \in \mathbb{Z}$

(C) $\left(2n\pi - \frac{\pi}{2}\right), \left(n\pi + \frac{\pi}{4}\right),\ n \in \mathbb{Z}$ (D) All

3. The non-zero positive integer 'b' for which the equation $\tan^4 x - 2\sec^2 x + b^2 = 0$ has at least one real solution is

(A) 1 (B) 2 (C) 3 (D) 4

4. If $f(x) = \max\{\tan x, \cot x\}$. The number of roots of the equation $f(x) = \frac{1}{2+\sqrt{3}}$ in $(0, 2\pi)$ is

(A) 0 (B) 2 (C) 4 (D) ∞

5. The most general values of x for which $\sin x + \cos x = \min\left\{1, a^2 - 4a + 6\right\},\ a \in \mathbb{R}$ are given by

(A) $2n\pi, n \in \mathbb{Z}$ (B) $2n\pi + \frac{\pi}{2},\ n \in \mathbb{Z}$

(C) $n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4},\ n \in \mathbb{Z}$ (D) None

6. The number of solutions of the equation $\sin\left(\frac{\pi x}{2\sqrt{3}}\right) = x^2 - 2\sqrt{3}x + 4$

(A) forms an empty set (B) only one (C) is only two (D) is greater then two

7. The number of solution of the equation $1 + \sin x . \sin^2\left(\frac{x}{2}\right) = 0$ in $[-\pi, \pi]$ is

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

8. The equation $\cos 4x - (\lambda + 2)\cos 2x - (\lambda + 3) = 0$ possesses a solution if

(A) $\lambda > -3$ (B) $\lambda < -2$ (C) $-6 < \lambda < -2$ (D) $\lambda \in z^+$

9. The general solution of the equation $2^{\cos^2 x} + 1 = 3.2^{-\sin^2 x}$ is

(A) $n\pi . n \in \mathbb{Z}$ (B) $(n+1)\pi,\ n \in \mathbb{Z}$ (C) $(n-1)\pi,\ n \in \mathbb{Z}$ (D) None

10. The number of integral ordered pairs satisfies the equations $\cos(xy) = x,\ \tan(xy) = y$

(A) 0 (B) 1 (C) 2 (D) 4

11. If $0 \le x \le 2\pi$ and $2^{\operatorname{cosec}^2 x} \times \sqrt{\frac{y^2}{2} - y + 1} \le \sqrt{2}$, then the number of ordered pairs of (x, y) is

(A) 1 (B) 2 (C) 3 (D) infinitely many

12. If $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0$ then θ is

(A) $n\pi + (-1)^n \frac{\pi}{6}$ (B) $n\pi - (-1)^n \frac{\pi}{6}$ (C) $\frac{n\pi}{4} + (-1)^n \frac{\pi}{24}$ (D) $\frac{n\pi}{4} - (-1)^n \frac{\pi}{24}$

13. If α & β are the roots of $a\cos\theta + b\cos\theta = c$, then $\tan\left(\frac{\alpha}{2}\right), \tan\left(\frac{\beta}{2}\right)$ is

(A) $\frac{2b}{a+c}$ (B) $\frac{c-a}{c+a}$ (C) $\frac{2bc}{a^3+b^3}$ (D) $\frac{c^2-a^2}{a^2+b^2}$

14. The solution of $|\cos x| = \cos x - 2\sin x$ is

(A) $x = n\pi,\ n \in \mathbb{Z}$ (B) $x = n\pi + \frac{\pi}{4},\ n \in \mathbb{Z}$ (C) $x = n\pi + (-1)^n \frac{\pi}{4},\ n \in \mathbb{Z}$ (D) $(2n+1)\pi + \frac{\pi}{4},\ n \in \mathbb{Z}$

15. The general solution of the equation $\tan^2(x+y) + \cot^2(x+y) = 1 - 2x - x^2$ lies on the line

(A) $x = -1$ (B) $x = -2$ (C) $y = -1$ (D) $y = -2$

16. The number of solutions of $\sin\theta + 2\sin 2\theta + 3\sin 3\theta + 4\sin 4\theta = 10$ in $(0,\pi)$ is

(A) 1 (B) 2 (C) 4 (D) 0

17. The number of solutions of the equation $4\sin^2 x + \tan^2 x + \cot^2 x + \operatorname{cosec}^2 x = 6$ in $[0,2\pi]$

(A) 1 (B) 2 (C) 3 (D) 4

18. The number of solution of $\tan(2x) = \tan(6x)$ in $(0,3\pi)$ is

(A) 6 (B) 5 (C) 12 (D) 11

19. Let $f(\theta) = \left(\cos\theta - \cos\frac{\pi}{8}\right)\left(\cos\theta - \cos\frac{3\pi}{8}\right)\left(\cos\theta - \cos\frac{5\pi}{8}\right)\left(\cos\theta - \cos\frac{7\pi}{8}\right)$ then

(A) maximum value of $f(\theta)$ is $-\frac{1}{4}$ (B) minimum value of $f(\theta)$ is $\frac{1}{8}$

(C) maximum value of $f(\theta)$ is $\frac{1}{8}$ (D) minimum value of $f(\theta)$ is $-\frac{1}{4}$

20. General solution of $\frac{\sin^2 2x + 4\sin^4 x - 4\sin^2 x.\cos^2 x}{4 - \sin^2 2x - 4\sin^2 x} = \frac{1}{9}$, is $(n \in \mathbb{Z})$

(A) $n\pi \pm \frac{\pi}{6}$ (B) $n\pi \pm \frac{\pi}{3}$ (C) $\frac{n\pi}{2} \pm \frac{\pi}{12}$ (D) $\frac{n\pi}{2} \pm \frac{\pi}{6}$

Numerical based

21. Number of solutions of the equation: $\log_{\left(\frac{9x-x^2-14}{7}\right)}(\sin 3x - \sin x) = \log_{\left(\frac{9x-x^2-14}{7}\right)} \cos 2x$ is equal to _____

22. The complete set of values of x satisfying $\frac{2\sin 6x}{\sin x - 1} < 0$ and $\sec^2 x - 2\sqrt{2}\tan x \le 0$ in $\left(0, \frac{\pi}{2}\right)$ is $[a,b) \cup (c,d]$, then value of $\left(\frac{cd}{ab}\right) =$ _____

23. If the sum of all values of $\theta, 0 \le \theta \le 2\pi$ satisfying the equation $(8\cos 4\theta - 3)(\cot\theta + \tan\theta - 2)(\cot\theta + \tan\theta + 2) = 12$ is $k\pi$, then k is equal to _____

24. The positive integer 'n' such that $\sin\left(\frac{\pi}{2n}\right) + \cos\left(\frac{\pi}{2n}\right) = \frac{\sqrt{n}}{2}$ is _____

25. Number of solutions of $x^4 - 2x^2\sin^2\left(\frac{\pi}{2}\right)x + 1 = 0$ is _____

KEY

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

→ Wish You all the Best ←