TRIGONOMETRIC EQUATIONS SHEET- 2

Q.1 Number of solutions of the equation $\cos 6x + \tan^2 x + \cos 6x \cdot \tan^2 x = 1$ in the interval $[0, 2\pi]$ is-

(A) 4 (B) 5 (C) 6 (D) 7

Q.2 If $\frac{\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha ..... + 2^{n-1}\tan 2^{n-1}\alpha}{\cot\alpha + 2^n} = 1$, $n \in N$ then general solution of α is,

(A) $\alpha = 2^{-n}\left(n\pi - \frac{\pi}{4}\right)$ (B) $\alpha = 2^n\left(n\pi + \frac{\pi}{4}\right)$

(C) $\alpha = 2^{-n}\left(n\pi + \frac{\pi}{4}\right)$ (D) None

Q.3 If $\vec{u}$ & $\vec{v}$ are non-zero vectors such that one of them can be expressed as a scalar multiple of other & satisfy $(2\cos\theta + 1)\vec{u} + (\sqrt{3}\cot\theta + 1)\vec{v} = 0$ then most general value of θ is

(A) $n\pi + \frac{2\pi}{3}; n \in I$ (B) $n\pi + \frac{5\pi}{6}; n \in I$

(C) $2n\pi + \frac{2\pi}{3}; n \in I$ (D) $2n\pi + \frac{5\pi}{6}; n \in I$

Q.4 The solution of $\frac{3\sin\theta - \sin 3\theta}{1+\cos\theta} + \frac{3\cos\theta + \cos 3\theta}{1-\sin\theta} = 4\sqrt{2}\cos\left(\theta + \frac{\pi}{4}\right)$ is

(A) $n\pi$ (B) $n\pi + \frac{\pi}{12}$

(C) $n\pi \pm \frac{\pi}{2}$ (D) $2n\pi$

Q.5 The general solution of the equation

$\frac{1 - \sin x + ... + (-1)^n \sin^n x + ...}{1 + \sin x + ... + \sin^n x + ...} = \frac{1-\cos 2x}{1+\cos 2x}$ is

(A) $(-1)^n(\pi/3) + n\pi$

(B) $(-1)^n(\pi/6) + n\pi$

(C) $(-1)^{n+1}(\pi/6) + n\pi$

(D) $(-1)^{n-1}(\pi/3) + n\pi$, $(n \in I)$

Q.6 The number of solution of $\log_{\sin x} 2^{\tan x} > 0$ in the interval $\left(0, \frac{\pi}{2}\right)$ is -

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

Q.7 If m and n(> m) are positive integers, the number of solutions of equation $n|\sin x| = m|\cos x|$ in $[0, 2\pi]$ is -

(A) m (B) n

(C) mn (D) None of these

Q8 The equation $3^{\sin 2x + 2\cos^2 x} + 3^{1 - \sin 2x + 2\sin^2 x} = 28$ is satisfied for the values of x given by –

(A) $\cos x = 0, \tan x = -1$

(B) $\tan x = 0$

(C) $\tan x = 1$

(D) None of these

Q.9 The most general solution of

$2^{\sin x} + 2^{\cos x} = 2^{1 - \frac{1}{\sqrt{2}}}$ is-

(A) $n\pi + \frac{\pi}{4}$ (B) $n\pi - \frac{\pi}{4}$

(C) $n\pi + (-1)^n \frac{\pi}{4}$ (D) $2n\pi + \frac{\pi}{4}$

Q.10 The value of 'a' for which the equation $4\,\text{cosec}^2(\pi(a + x)) + a^2 - 4a = 0$ has a real solution is-

(A) a = 1 (B) a = 2

(C) a = 3 (D) None of these

Q.11 The most general values of x for which

$\sqrt{3}\sin x - \cos x = \min_{\lambda \in R}\{2, e^2, \pi, \lambda^2 - 4\lambda + 7\}$

are given by -

(A) $2n\pi$ (B) $2n\pi + \frac{2\pi}{3}$

(C) $n\pi + (-1)^n \frac{\pi}{4} + \frac{\pi}{6}$ (D) $n\pi + (-1)^{n+1}\frac{\pi}{4} - \frac{\pi}{3}$

Q.12 Sum of the roots of the equation $\tan^2 33x = \cos 2x - 1$ lying in the interval $[0, 314]$ is-

(A) 4950π (B) 5050π

(C) 4851π (D) None of these

Q.13 The number of points inside or on the circle $x^2 + y^2 = 4$ satisfying $\tan^4 x + \cot^4 x + 1 = 3\sin^2 y$, is-

(A) 1 (B) 2

(C) 4 (D) ∞

Q.14 The solution of $4\sin^2 x + \tan^2 x + \text{cosec}^2 x + \cot^2 x - 6 = 0$ is -

(A) $n\pi \pm \pi/4$ (B) $2n\pi \pm \pi/4$

(C) $n\pi + \pi/4$ (D) $n\pi - \pi/4$

Q.15 5If $\log_{1/\sqrt{2}} \sin x > 0$, $x \in [0, 4\pi)$ then the number of x values which are integral multiple of $\pi/4$ is/are

(A) 6 (B) 4

(C) 3 (D) 1

Q.16 In the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ the equation $\log_{\sin\theta}(\cos 2\theta) = 2$ has

(A) no solution

(B) a unique solution

(C) two solutions

(D) infinitely many solutions

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Q.17 If the equation $\sin\theta (\sin\theta + 2\cos\theta) = a$ has a real solution, then the shortest interval containing all possible values of 'a' is

(A) $\left[\frac{1-\sqrt{5}}{2}, \frac{1+\sqrt{5}}{2}\right]$ (B) $\left(\frac{\sqrt{5}-1}{2}, \frac{\sqrt{5}+1}{2}\right)$

(C) $\left(-\frac{1}{2}\frac{1}{2}\right)$ (D) none of these

Q.18 The equation $\cos^4 x - \sin^4 x + \cos 2x + \alpha^2 + \alpha = 0$ will have atleast one solution. If -

(A) $\alpha > 3$ (B) $\alpha < 3$

(C) $\alpha = 1$ (D) None of these

Q.19 If in ΔABC, $\tan A + \tan B + \tan C = x^2 + 6x + 5$, then set of values of x for which ΔABC is obtuse angled, is -

(A) (–7, –6) (B) (–5, 1)

(C) (–5, –1) (D) (–7, 6)

Q.20 The Number of solutions of the equation $\sin^3 x \cos x + \sin^2 x \cos^2 x + \sin x \cos^3 x = 1$ in the interval $[0, 2\pi]$ is/are-

(A) 0 (B) 2

(C) 3 (D) infinite

Q.21 The equation $\sin^4 x - 2\cos^2 x + a^2 = 0$ can be solved if -

(A) $-\sqrt{3} \le a \le \sqrt{3}$ (B) $-\sqrt{2} \le a \le \sqrt{2}$

(C) $-1 \le a \le 1$ (D) None of these

Q.22 The number of solutions of the equation $|\sin x| = |\cos 3x|$ in $[-2\pi, 2\pi]$ is-

(A) 32 (B) 28 (C) 24 (D) 30

Q.23 If $1 + \cot\theta = \operatorname{cosec}\theta$, then the general value of θ is -

(A) $n\pi + \frac{\pi}{2}$ (B) $2n\pi - \frac{\pi}{2}$

(C) $2n\pi + \frac{\pi}{2}$ (D) none of these

Q.24 If $|\cos x|^{\sin^2 x - \frac{3}{2}\sin x + \frac{1}{2}} = 1$, then possible values of x are

(A) $n\pi$ or $n\pi + (-1)^n \pi/6$, $n \in I$

(B) $n\pi$ or $2n\pi + \pi/2$ or $n\pi + (-1)^n \pi/6$, $n \in I$

(C) $n\pi + (-1)^n \pi/6$, $n \in I$

(D) $n\pi$, $n \in I$

Q.25 The solution of the inequality $\sin^6 x + \cos^6 x > \frac{5}{8}$ can lie in

(A) $\left(\frac{-\pi}{8}, \frac{\pi}{8}\right)$ (B) $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$

(C) $\left(\frac{3\pi}{8}, \frac{5\pi}{8}\right)$ (D) All are correct

ANSWER KEYS

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