TRIGONOMETRIC EQUATION - PYQ

1. Find the no. of roots of the equation $\tan x + \sec x = 2\cos x$ in the interval $[0, 2\pi]$- **[AIEEE 2002]**

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

2. General solution of $\tan 5\theta = \cot 2\theta$ is- **[AIEEE 2002]**

(1) $\theta = \frac{n\pi}{7} + \frac{\pi}{14}$ (2) $\theta = \frac{n\pi}{7} + \frac{\pi}{5}$

(3) $\theta = \frac{n\pi}{7} + \frac{\pi}{2}$ (4) $\theta = \frac{n\pi}{7} + \frac{\pi}{3}$

3. The number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin^2 x + 5\sin x - 3 = 0$ is- **[AIEEE 2006]**

(1) 6 (2) 1 (3) 2 (4) 4

4. The possible values of $\theta \in (0, \pi)$ such that $\sin(\theta) + \sin(4\theta) + \sin(7\theta) = 0$ are: **[AIEEE 2011]**

(1) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{4\pi}{9}, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{8\pi}{9}$

(2) $\frac{\pi}{4}, \frac{5\pi}{12}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

(3) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{35\pi}{36}$

(4) $\frac{2\pi}{9}, \frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{8\pi}{9}$

5. The number of solutions of the equation $\sin 2x - 2\cos x + 4\sin x = 4$ in the interval $[0, 5\pi]$ is : **[JEE(Main)-2013 (Online)]**

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

6. Let $A = \{\theta : \sin(\theta) = \tan(\theta)\}$ and $B = \{\theta : \cos(\theta) = 1\}$ be two sets. Then : **[JEE(Main)-2013 (Online)]**

(1) $A = B$ (2) $A \subset B$ and $B - A \neq \phi$

(3) $A \not\subset B$ (4) $B \not\subset A$

7. The number of values of α in $[0, 2\pi]$ for which $2\sin^3\alpha - 7\sin^2\alpha + 7\sin\alpha = 2$, is : **[JEE(Main)-2014 (Online)]**

(1) 6 (2) 1 (3) 4 (4) 3

8. The number of distinct real roots of $\begin{vmatrix} \cos x & \sin x & \sin x \\ \sin x & \cos x & \sin x \\ \sin x & \sin x & \cos x \end{vmatrix} = 0$ in the interval $[-\pi/4, \pi/4]$ is- **[JEE Main 2016(Online)]**

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

9. Let $P = \{\theta : \sin\theta - \cos\theta = \sqrt{2}\cos\theta\}$ and $Q = \{\theta : \sin\theta + \cos\theta = \sqrt{2}\sin\theta\}$ be two sets. Then **[JEE Main 2016(Online)]**

(1) $P \subset Q$ and $Q - P \neq \phi$ (2) $Q \not\subset P$

(3) $P \not\subset Q$ (4) $P = Q$

10. If $0 \le x < 2\pi$, then the number of real values of x, which satisfy the equation $\cos x + \cos 2x + \cos 3x + \cos 4x = 0$, is :- **[JEE (Main)-2016]**

(1) 9 (2) 3 (3) 5 (4) 7

11. If sum of all the solutions of the equation $8\cos x \cdot \left(\cos\left(\frac{\pi}{6}+x\right).\cos\left(\frac{\pi}{6}-x\right) - \frac{1}{2}\right) = 1$ in $[0, \pi]$ is $k\pi$, then k is equal to : **[JEE(Main)-2018(Online)]**

(1) $\frac{13}{9}$ (2) $\frac{8}{9}$ (3) $\frac{20}{9}$ (4) $\frac{2}{3}$

12. The number of solutions of $\sin 3x = \cos 2x$, in the interval $\left(\frac{\pi}{2}, \pi\right)$ is :- **[JEE(Main)-2018(Online)]**

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

13. The smallest positive root of the equation $\tan x - x = 0$ lies on **[IIT 94]**

(1) $\left(0, \frac{\pi}{2}\right)$ (2) $\left(\frac{\pi}{2}, \pi\right)$ (3) $\left(\pi, \frac{3\pi}{2}\right)$ (4) $\left(\frac{3\pi}{2}, 2\pi\right)$

14. General value of θ satisfying equation $\tan^2\theta + \sec 2\theta = 1$ is- **[IIT 96]**

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

(3) $n\pi - \frac{\pi}{3}$ (4) All of these

15. The graph of the function **[IIT 97]**
$\cos x \cos(x + 2) - \cos^2(x + 1)$ is :

(1) a straight line passing through $(0, -\sin^2 1)$ with slope 2

(2) a straight line passing through (0,0)

(3) a parabola with vertex $(1, -\sin^2 1)$

(4) a straight line passing through the point $\left(\frac{\pi}{2}, -\sin^2 1\right)$ and parallel to the x-axis

16. The solution set of the system of equations :

$x + y = \frac{2\pi}{3}$, $\cos x + \cos y = \frac{3}{2}$, where x and y are real is : **[IIT 98]**

(1) a finite non empty set (2) null set

(3) ∞ (4) none of these

17. 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

18. The number of integral values of k for which the equation $7\cos x + 5\sin x = 2k + 1$ has a solution is- **[IIT 2002]**

(1) 4 (2) 8 (3) 10 (4) 12

19. The set of values of θ satisfying the inequation $2\sin^2\theta - 5\sin\theta + 2 > 0$ where $0 < \theta < 2\pi$ is- **[IIT 2006]**

(1) $\left(0,\frac{\pi}{6}\right)\cup\left(\frac{5\pi}{6},2\pi\right)$ (2) $\left[0,\frac{\pi}{6}\right]\cup\left[\frac{5\pi}{6},2\pi\right]$

(3) $\left[0,\frac{\pi}{3}\right]\cup\left[\frac{2\pi}{3},2\pi\right]$ (4) None of these

***20.** Root of the equation **[IIT 2009]**

$2\sin^2\theta + \sin^2 2\theta = 2$ is :

(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{2}$

21. The positive integer value of $n > 3$ satisfying the equation **[IIT 2011]**

$$\frac{1}{\sin\left(\frac{\pi}{n}\right)} = \frac{1}{\sin\left(\frac{2\pi}{n}\right)} + \frac{1}{\sin\left(\frac{3\pi}{n}\right)} \text{ is}$$

(1) 4 (2) 6

(3) 7 (4) 9

22. The number of distinct solution of the equation

$\frac{5}{4}\cos^2 2x + \cos^4 x + \sin^4 x + \cos^6 x + \sin^6 x = 2$ in the interval $[0, 2\pi]$ is – **[IIT 2015]**

(1) 4 (2) 8

(3) 6 (4) 10

* Marked Question is multiple answer

PREVIOUS YEARS QUESTIONS — ANSWER KEY — Exercise-II

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**2**	**1**	**4**	**1**	**3**	**3**	**4**	**2**	**4**	**4**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**1**	**4**	**3**	**4**	**4**	**2**	**3**	**2**	**1**	**2,4**
Que.	21	22								
Ans.	**3**	**2**								