EXERCISE – V

JEE PROBLEMS

1. Find real values of x for which, $27^{\cos 2x} \cdot 81^{\sin 2x}$ is minimum. Also find this minimum value. **[REE 2000, 3]**

2. Solve the following system of equation for x and y

$5^{(\operatorname{cosec}^2 x - 3\sec^2 y)} = 1$ and $2^{(2\operatorname{cosec} x + \sqrt{3}|\sec y|)} = 64$.

[REE 2001 (mains), 3]

3. The number of integral values of k for which the equation 7 cos x + 5 sin x = 2k + 1 has a solution is

(A) 4 (B) 8 (C) 10 (D) 12

[JEE 2002 (Screening), 3]

4. $\cos(\alpha - \beta) = 1$ and $\cos(\alpha + \beta) = 1/e$,
where $\alpha, \beta \in [-\pi, \pi]$, number of pairs of α, β which satisfy both the equations is **[JEE 2005 (Screening)]**

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

5. If $0 < \theta < 2\pi$, then the intervals of values of θ for which $2\sin^2\theta - 5\sin\theta + 2 > 0$, is **[JEE 2006, 3]**

(A) $\left(0, \frac{\pi}{6}\right) \cup \left(\frac{5\pi}{6}, 2\pi\right)$ (B) $\left(\frac{\pi}{8}, \frac{5\pi}{6}\right)$

(C) $\left(0, \frac{\pi}{8}\right) \cup \left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$ (D) $\left(\frac{41\pi}{48}, \pi\right)$

6. The number of solutions of the pair of equations
$2\sin^2\theta - \cos 2\theta = 0$ and $2\cos^2\theta - 3\sin\theta = 0$
in the interval $[0, 2\pi]$ is **[JEE 2007, 3]**

(A) zero (B) one (C) two (D) four

7. For $0 < \theta < \pi/2$, then solution(s) of

$$\sum_{m=1}^{6} \operatorname{cosec}\,(\theta + (m-1)\pi/4)\,\operatorname{cosec}(\theta + m\pi/4) = 4\sqrt{2}$$

is(are) **[JEE 2009]**

(A) $\pi/4$ (B) $\pi/6$ (C) $\pi/12$ (D) $5\pi/12$

8. The number of values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

such that $\theta \neq \frac{n\pi}{5}$ for n=0, ±1, ±2 and $\tan\theta = \cot 5\theta$

as well as $\sin 2\theta = \cos 4\theta$ is **[JEE 2010]**

9. The number of all possible values of θ when $\theta \in (0, \pi)$ for which the system of equation **[JEE 2010]**

$(y + z)\cos 3\theta = (xyz)\sin 3\theta$

$x \sin 3\theta = \frac{2\cos 3\theta}{y} + \frac{2\sin 3\theta}{z}$

$(xyz)\sin 3\theta = (y + 2z)\cos 3\theta + y \sin 3\theta$

have a solution (x_0, y_0, z_0) with $y_0, z_0 \neq 0$ is

10. 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 2011]**

(A) $P \subset Q$ and $Q - P \neq \varnothing$ (B) $Q \not\subset P$

(C) $P \not\subset Q$ (D) $P = Q$