

Trigonometric Identities & Equations

Date Planned : __ / __ / __	Daily Tutorial Sheet - 12	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Numerical Value Type for JEE Main	Exact Duration : _____

- 141.** If $0 < \alpha < \frac{\pi}{2}$ and $\sin A + \cos A + \tan A + \cot A + \sec A + \csc A = 7$, $\sin A$ and $\cos A$ are roots of equation $4x^2 - 3x + \alpha = 0$, then the value of $\left| \frac{25\alpha}{4} \right|$ is _____.
- 142.** If $2k - 4 = 0$ and $\sin x + \csc x = k$, $0 < x \leq \frac{\pi}{2}$, $\forall n \in \mathbb{N}$, then the value of $\sin^n x + \csc^n x$ is _____.
- 143.** If $\tan(\pi \cos \theta) = \cot(\pi \sin \theta)$ and $\cos\left(\theta - \frac{\pi}{4}\right) = \pm \frac{1}{\lambda\sqrt{\mu}}$, then the value of $\lambda + \mu$ is _____. ▶
- 144.** If $\tan \theta_1, \tan \theta_2, \tan \theta_3, \tan \theta_4$ are roots of the equation $x^4 - x^3 \sin 2\beta + x^2 \cos 2\beta - x \cos \beta - \sin \beta = 0$ and $\tan(\theta_1 + \theta_2 + \theta_3 + \theta_4) = \cot(n\beta)$, then n is equal to _____.
- 145.** If $a \sin \theta = b \sin\left(\theta + \frac{2\pi}{3}\right) = c \sin\left(\theta + \frac{4\pi}{3}\right)$, then the value of $ab + bc + ca$ is _____.
- 146.** The expression $\frac{\cos 6x + 6 \cos 4x + 15 \cos 2x + 10}{\cos 5x + 5 \cos 3x + 10 \cos x} = \lambda \cos x$, then the value of λ is _____.
- 147.** If $\cos \alpha + \cos \beta + \cos \gamma + \cos(\alpha + \beta + \gamma) = \lambda \cos\left(\frac{\alpha + \beta}{2}\right) \cos\left(\frac{\beta + \gamma}{2}\right) \cos\left(\frac{\gamma + \alpha}{2}\right)$, then the value of λ is _____.
- 148.** The maximum value of the expression $F(\theta) = \frac{1}{\sin^2 \theta + 3 \sin \theta \cos \theta + 5 \cos^2 \theta}$ is _____.
- 149.** If $\frac{\cos \theta_1}{\cos \theta_2} + \frac{\sin \theta_1}{\sin \theta_2} = \frac{\cos \theta_0}{\cos \theta_2} + \frac{\sin \theta_0}{\sin \theta_2} = 1$, where θ_1 and θ_0 do not differ by an odd multiple of π , then the value of $\left| \frac{\cos \theta_1 \cos \theta_0}{\cos^2 \theta_2} + \frac{\sin \theta_1 \sin \theta_0}{\sin^2 \theta_2} \right|$ is _____. ▶
- 150.** Suppose $\sin^3 x \sin 3x = \sum_{m=0}^n C_m \cos mx$ is an identity in x , where $C_0, C_1, \dots, C_n$ are constants and $C_m \neq 0$. Then, the value of n is _____. ▶
- 151.** If α is the common positive root of equations $x^2 - ax + 12 = 0$, $x^2 - bx + 15 = 0$ and $x^2 - (a+b)x + 36 = 0$ and $\cos x + \cos 2x + \cos 3x = \alpha$, then the value of $\sin x + \sin 2x + \sin 3x$ is _____.
- 152.** If $\tan \theta = \sqrt{\frac{3}{2}}$ and the sum of the infinite series $1 + 2(1 - \cos \theta) + 3(1 - \cos \theta)^2 + 4(1 - \cos \theta)^3 + \dots \infty$ is $\frac{\lambda}{2}$, then the value of λ is _____.
- 153.** 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 _____.
- 154.** The value of p for which the equation $4 \csc^2 \{ \pi(p+t) \} + p^2 - 4p = 0$ has a real solution is _____. ▶
- 155.** The number of solutions of $\sum_{r=1}^5 \cos rx = 5$ in the interval $[0, 2\pi]$ is _____.