

Trigonometric Functions and Equations

EE24BTECH11001- ADITYA TRIPATHY

A: FILL IN THE BLANKS

- Suppose $\sin^3 x \sin 3x = \sum_{m=0}^n C_m \cos x$ is an identity in x , where C_0, C_1, \dots, C_n are constants and $C_n \neq 0$ then the value of n is (1981 – 2Marks)
 - $\frac{-4}{5}$ but not $\frac{4}{5}$
 - $\frac{4}{5}$ or $\frac{-4}{5}$
 - $\frac{4}{5}$ but not $\frac{-4}{5}$
 - None of These
 - If $\alpha + \beta + \gamma = 2\pi$ (1979)
 - $\tan \frac{\alpha}{2} + \tan \frac{\beta}{2} + \tan \frac{\gamma}{2} = \tan \frac{\alpha}{2} \tan \frac{\beta}{2} \tan \frac{\gamma}{2}$
 - $\tan \frac{\alpha}{2} \tan \frac{\beta}{2} + \tan \frac{\beta}{2} \tan \frac{\gamma}{2} + \tan \frac{\gamma}{2} \tan \frac{\alpha}{2} = 1$
 - $\tan \frac{\alpha}{2} + \tan \frac{\beta}{2} + \tan \frac{\gamma}{2} = -\tan \frac{\alpha}{2} \tan \frac{\beta}{2} \tan \frac{\gamma}{2}$
 - None of These
 - Given $A = \sin^2 \theta + \cos^4 \theta$ then for all real values of θ (1980)
 - $1 \leq A \leq 2$
 - $\frac{3}{4} \leq A \leq 1$
 - $\frac{13}{16} \leq A \leq 1$
 - $\frac{3}{4} \leq A \leq \frac{13}{16}$
 - The equation $2 \cos^2 \frac{x}{2} \sin^2 x = x^2 + x^{-2}$ (1980)
 - no real solution
 - one real solution
 - more than one real solution
 - None of these
 - The general solution to the trigonometric equation $\sin x + \cos x = 1$ is given by (1981 – 2Marks)
 - $x = 2n\pi; n = 0, \pm 1, \pm 2 \dots$
 - $x = 2n\pi + \frac{\pi}{2}; n = 0, \pm 1, \pm 2 \dots$
 - $x = n\pi + (-1)^n \frac{\pi}{4}; n = 0, \pm 1, \pm 2 \dots$
 - none of these
 - The value of the expression $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ$ is equal to (1988 – 2Marks)
 - 2
 - $2 \sin 20^\circ / \sin 40^\circ$
 - 4
 - $2 \sin 20^\circ / \sin 40^\circ$
- Suppose $\sin^3 x \sin 3x = \sum_{m=0}^n C_m \cos x$ is an identity in x , where C_0, C_1, \dots, C_n are constants and $C_n \neq 0$ then the value of n is (1981 – 2Marks)
 - 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 (1987 – 2Marks)
 - The set of all x in the interval $[0, \pi]$ for which $2 \sin^2 x - 3 \sin x + 1 \geq 0$, is (1987 – 2Marks)
 - The sides of a triangle in a given circle subtend angles α, β, γ . The minimum value of arithmetic mean of $\cos(\alpha + \frac{\pi}{2}), \cos(\beta + \frac{\pi}{2}), \cos(\gamma + \frac{\pi}{2})$ is equal to (1987 – 2Marks)
 - The value of $\sin \frac{\pi}{14} \sin \frac{3\pi}{14} \sin \frac{5\pi}{14} \sin \frac{7\pi}{14} \sin \frac{9\pi}{14} \sin \frac{11\pi}{14} \sin \frac{13\pi}{14}$ is equal to (1991 – 2Marks)
 - If $K = \sin(\frac{\pi}{18}) \sin(\frac{5\pi}{18}) \sin(\frac{7\pi}{18})$ then the numerical value of K is (1993 – 2Marks)
 - If $A > 0, B > 0$ and $A + B = \frac{\pi}{3}$, then the maximum value $\tan A \tan B$ is (1993 – 2Marks)
 - General value of θ satisfying the equation $\tan^2 \theta + \sec 2\theta = 1$ is (1996 – 1Mark)
 - The real roots of the equation $\cos^7 x + \sin^4 x = 1$ in the interval $(-\pi, \pi)$ are (1997 – 2Marks)

B: TRUE / FALSE

- If $\tan A = \frac{1 - \cos B}{\sin B}$, then $\tan 2A = \tan B$ (1981 – 1Mark)
- There exists a value of θ between 0 and 2π that satisfies the equation $\sin^4 \theta - 2 \sin^2 \theta - 1 = 0$. (1984 – 1Mark)

C :MCQs WITH ONE CORRECT ANSWER

- If $\tan \theta = -\frac{4}{3}$ then $\sin \theta$ is (1979)