Trignometric Functions and Equations

EE24BTECH11001- ADITYA TRIPATHY

A: Fill In The Blanks

1) Suppose $\sin^3 x \sin 3x = \sum_{m=0}^{n} C_m \cos x$ is an identity in x, where $C_0, C_1, \cdots, C_n$ are constants and $C_n \neq 0$ then the value of n is $(1981-2Marks)$
2) 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 - 2 Mark)*
3) The set of all x in the interval $[0,\pi]$ for which $2\sin^2 x-3\sin x+1 \geq 0$, is $(1987-2mark)$
4) The sides of a triangle in a given circle subtend angles α, β, γ. The minimum value of arithmetic mean of $\cos\left(\alpha+\frac{\pi}{2}\right)$, $\cos\left(\beta+\frac{\pi}{2}\right)$, $\cos\left(\gamma+\frac{\pi}{2}\right)$ is equal to $(1987-2Marks)$
5) 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 $(1991-2Marks)$
6) If $K=\sin(\frac{\pi}{18})\sin(\frac{5\pi}{18})\sin(\frac{7\pi}{18})$ then the numerical value of K is $(1993-2Marks)$
7) If $A>0, B>0$ and $A+B=\frac{\pi}{3}$, then the maximum value $\tan A\tan B$ is $(1993-2Marks)$
8) General value of θ satisfying the equation $\tan^2\theta+\sec 2\theta=1$ is $(1996-1Mark)$
9) The real roots of the equation $\cos^7 x+\sin^4 x=1$ in the interval $(-\pi,\pi)$ are $(1997-2Marks)$

B: True / False

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

C :MCQs with One Correct Answer

1) If $\tan\theta=-\frac{4}{3}$ then $\sin\theta$ is (1979)
   (a) $\frac{-4}{5}$ but not $\frac{4}{5}$
   (b) $\frac{4}{5}$ or $\frac{-4}{5}$
   (c) $\frac{4}{5}$ but not $\frac{-4}{5}$
   (d) None of These
2) If $\alpha+\beta+\gamma=2\pi$ (1979)
   (a) $\tan\frac{\alpha}{2}+\tan\frac{\beta}{2}+\tan\frac{\gamma}{2}=\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$
   (b) $\tan\frac{\alpha}{2}\tan\frac{\beta}{2}+\tan\frac{\beta}{2}\tan\frac{\gamma}{2}+\tan\frac{\gamma}{2}\tan\frac{\alpha}{2}=1$
   (c) $\tan\frac{\alpha}{2}+\tan\frac{\beta}{2}+\tan\frac{\gamma}{2}=-\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$
   (d) None of These
3) Given $A=\sin^2\theta+\cos^4\theta$ then for all real values of θ (1980)
   (a) $1\leq A\leq 2$
   (b) $\frac{3}{4}\leq A\leq 1$
   (c) $\frac{13}{16}\leq A\leq 1$
   (d) $\frac{3}{4}\leq A\leq\frac{13}{16}$
4) The equation $2\cos^2\frac{x}{2}\sin^2 x=x^2+x^{-2}$ (1980)
   (a) no real solution
   (b) one real solution
   (c) more than one real solution
   (d) None of these
5) The general solution to the trignometric equation $\sin x+\cos x=1$ is given by $(1981-2Marks)$
   (a) $x=2n\pi; n=0,\pm1,\pm2\cdots$
   (b) $x=2n\pi+\frac{\pi}{2}, n=0,\pm1,\pm2\cdots$
   (c) $x=n\pi+(-1)^n\frac{\pi}{4}, n=0,\pm1,\pm2\cdots$
   (d) none of these
6) The value of the expression $\sqrt{3}\,\mathrm{cosec}\,20^\circ-\sec 20^\circ$ is equal to $(1988-2Marks)$
   (a) 2
   (b) $2\sin 20^\circ/\sin 40^\circ$
   (c) 4
   (d) $2\sin 20^\circ/\sin 40^\circ$