ASSIGNMENT 1

EE24BTECH11005 - Arjun Pavanje*

E: Subjective Questions

6. Without using tables prove that $(\sin 12^\circ)(\sin 48^\circ)(\sin 54^\circ) = \frac{1}{8}$

(1982 – 2*Marks*)

7. Show that $16(\cos\frac{2\pi}{15})(\cos\frac{4\pi}{15})(\cos\frac{8\pi}{15})(\cos\frac{16\pi}{15}) = 1$

(1983 – 2*Marks*)

8. Find all the solution of $4\cos^2 x \sin x - 2\sin^2 x = 3\sin x$

(1983-2 Marks)

9. Find the values of $x \in (-\pi, +\pi)$ which satisfy the equation $8^{(1+|\cos x|+|\cos^2 x|+|\cos^3 x|+\ldots)} = 4^3$

(1984 – 2*Marks*)

10. Prove that $\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha = \cot\alpha$

(1988 – 2*Marks*)

11. ABC is a triangle such that $\sin(2A+B) = \sin(C-A) = -\sin(B+2C) = \frac{1}{2}$ If A, B and C are in arithmetic progression, determine the values of A, B and C.

(1990 – 5*Marks*)

12. If $exp\{(\sin^2 x + \sin^4 x + \sin^6 x + \ldots\infty)ln2\}$ satisfies the equation $x^2 - 9x + 8$, find the value of $\frac{\cos x}{\cos x + \sin x}$, $0<x<\frac{\pi}{2}$

(1991 – 4*Marks*)

13. Show that the value of $\frac{\tan x}{\tan 3x}$, wherever defined never lies between $\frac{1}{3}$ and 3

(1992 – 4*Marks*)

14. Determine the smallest positive value of x (in degrees) for which $\tan(x+100^\circ) = \tan(x+50^\circ)\tan x\tan(x-50^\circ)$

(1993 – 5*Marks*)

15. Find the smallest positive number p for which the equation $\cos(p\sin x) = \sin(p\cos x)$ has a solution $x \in [0, \pi]$

(1995 – 5*Marks*))

16. Find all values of θ in the interval $(-\frac{\pi}{2}, \frac{\pi}{2}))$ satisfying the equation $(1-\tan\theta)(1+\tan\theta)\sec^2\theta + 2^{\tan^2\theta} = 0$

(1996 – 2*Marks*)

17. Prove that the values of the function $\frac{\sin x\cos 3x}{\sin 3x\cos x}$ does not lie between $\frac{1}{3}$ and 3 for any real x

(1997 – 5*Marks*)

18. Prove that $\sum_{k=1}^{n-1}(n-k)\cos\frac{2k\pi}{n} = -\frac{n}{2}$, where n≥3

(1997 – 5*Marks*)

19. In any triangle ABC, prove that $\cot\frac{A}{2} + \cot\frac{B}{2} + \cot\frac{C}{2} = \cot\frac{A}{2}\cot\frac{B}{2}\cot\frac{C}{2}$

(2000 – 3*Marks*)

20. Find the range of values oft for which $2\sin t = \frac{1-2x+5x^2}{3x^2-2x-1}$, t $\in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(2005 – 2*Marks*)