ASSIGNMENT- 2 – TRIGONOMETRIC FUNCTIONS

1. ii) If $\sin\alpha = k\sin\beta$; prove that $\tan\left(\frac{\alpha-\beta}{2}\right) = \frac{k-1}{k+1}\tan\left(\frac{\alpha+\beta}{2}\right)$
2. If tan A = 5/6 and tan B = 1/11 prove that A + B = π/4
3. If $\text{Tan}A = \frac{x}{x-1}$, $\text{Tan}B = \frac{1}{2x-1}$, prove that $A - B = \frac{\pi}{4}$
4. If A + B = 45°, then prove that i) (1 + tan A)(1 + tan B) = 2 ii) (cotA – 1)(cotB – 1) = 2
5. If tan(A + B) = m and tan(A – B) = n, show that : i) $\tan 2A = \frac{m+n}{1-mn}$ ii) $\tan 2B = \frac{m-n}{1+mn}$
6. Evaluate : i) Cos70° Cos10° + Sin70° Sin10° ii) Sin(40° + θ) Cos(10° + θ) – Cos(40° + θ) Sin(10° + θ)
7. In quadrilateral ABCD , prove that i) Sin(A+B) + Sin(C+D) = 0
   ii) CosA CosB – CosC CosD = SinA SinB – SinC SinD
8. Show that $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}} = 2\cos\theta$
9. Prove that $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$
10. Prove that $\cos 4x = 1 - 8\sin^2 x\cos^2 x$
11. Prove that $\tan 4x = \frac{4\tan x(1-\tan^2 x)}{1-6\tan^2 x+\tan^4 x}$
12. Prove that : i) $\cos\left(\frac{\pi}{4}+x\right)+\cos\left(\frac{\pi}{4}-x\right)=\sqrt{2}\cos x$ ii) $\cos\left(\frac{3\pi}{4}+x\right)-\cos\left(\frac{3\pi}{4}-x\right)=-\sqrt{2}\sin x$
13. Prove that : i) $\frac{\cos 7x+\cos 5x}{\sin 7x-\sin 5x}$ = cotx ii) $\frac{\cos 9x-\cos 5x}{\sin 17x-\sin 3x} = -\frac{\sin 2x}{\cos 10x}$
    iii) $\frac{\sin 5x+\sin 3x}{\cos 5x+\cos 3x}$ = tan4x iv) $\frac{\sin x+\sin 3x}{\cos x+\cos 3x}$ = tan2x
    v) $\frac{\cos 4x+\cos 3x+\cos 2x}{\sin 4x+\sin 3x+\sin 2x}$ = cot3x vi) $\frac{\sin 5x-2\sin 3x+\sin x}{\cos 5x-\cos x}=\tan x$
    vii) $\frac{Sinx+\sin 3x+\sin 5x+\sin 7x}{\cos x+\cos 3x+\cos 5x+\cos 7x}$ = tan4x viii) $\frac{\sin 5x+\sin 7x+\sin 9x+\sin 11x}{\cos 5x+\cos 7x+\cos 9x+\cos 11x}$ = tan8x
    ix) $\frac{\sin 3x+\sin 5x+\sin 7x+\sin 9x}{\cos 3x+\cos 5x+\cos 7x+\cos 9x}$ = tan6x x) $\frac{\sin(x+y)-2\sin x+\sin(x-y)}{\cos(x+y)-2\cos x+\cos(x-y)}=\tan x$
    xi) $\frac{(\cos x-\cos 3x)(\sin 8x+\sin 2x)}{(\sin 5x-\sin x)(\cos 4x-\cos 6x)}=1$
14. Prove that cosα + cosβ + cosγ + cos(α + β + γ) = $4\cos\frac{\alpha+\beta}{2}\cos\frac{\beta+\gamma}{2}\cos\frac{\gamma+\alpha}{2}$
15. Prove that i) $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4\sin^2\frac{x-y}{2}$ ii) $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2\frac{x+y}{2}$
16. Prove that: i) $\frac{\sin x\sin 2x+\sin 3x\sin 6x}{\sin x\cos 2x+\sin 3x\cos 6x}=\tan 5x$ ii) $\frac{\cos 8x\cos 5x-\cos 12x\cos 9x}{\sin 8x\cos 5x+\cos 12x\sin 9x}=\tan 4x$
    iii) $\frac{\sin 8x\cos x-\sin 6x\cos 3x}{\cos 2x\cos x-\sin 3x\sin 4x}=\tan 2x$ iv) $\cos 2x\cos\frac{x}{2}-\cos 3x\cos\frac{9x}{2}=\sin 5x\sin\frac{5x}{2}$
17. If $\tan(\alpha+\theta)=n\tan(\alpha-\theta)$, Show that (n +1)sin2θ = (n-1) sin2α
18. Prove that i) $\cos^2 x + \cos^2(x+120^0) + \cos^2(x-120^0) = 3/2$ ii) $\sin x + \sin\left(x+\frac{2\pi}{3}\right) + \sin\left(x+\frac{4\pi}{3}\right) = 0$
19. Prove that i) $\cos 20^0\cos 40^0\cos 60^0\cos 80^0=\frac{1}{16}$ ii) $\sin 20^0\sin 40^0\sin 60^0\sin 80^0=\frac{3}{16}$
20. Prove that: i) $\sin 36° = \sqrt{\frac{10-2\sqrt{5}}{4}}$ ii) $\cos 36° = \frac{\sqrt{5}+1}{4}$ iii) $\sin 18° = \frac{\sqrt{5}-1}{4}$
21. Show that $\frac{\sin x}{\cos 3x}+\frac{\sin 3x}{\cos 9x}+\frac{\sin 9x}{\cos 27x}=\frac{1}{2}(\tan 27x-\tan x)$