ASSIGNMENT : Trigonometry

Q.1 Find the diameter of Sun in km supposing that it subtends an angle of 32^o at the eye of an observer. Distance of the Sun is $91x10^6$ km. (Ans: 847407.4 km)

Q.2 If angular diameter of moon is 30^o, how far from the eye a coin of diameter 2.2 cm can be kept to hide the mood.(Ans: 252 cm)

Q.3 If sec x + tan x = p, find the value of sec x, tan x, sin x in term of p.

Q.4 Prove that:

(i) cos24 + cos55 + cos125 + cos204 + cos300 = 1/2

(ii) sin780.sin120 + cos240.sin390 = 1/2

(iii) $\sin^2\left(\frac{\pi}{18}\right) + \sin^2\left(\frac{\pi}{9}\right) + \sin^2\left(\frac{7\pi}{18}\right) + \sin^2\left(\frac{4\pi}{9}\right) = 2$

(iv) tan 15 + tan 30 + tan15.tan30 = 1

(v) $\frac{\cos 11 + \sin 11}{\cos 11 - \sin 11} = \tan 56$

(vi) $\frac{\tan 69 + \tan 66}{1 - tan69.tan66} = -1$

(vii) tan70 = tan20 + 2tan50

Q.5 If A+B = π/4 show that (1+tanA)(1+tanB) = 2

Q.6 If tanA = 5/6 tanB = 1/11, show that A+B= π/4

Q.7 If tanA = m/m-1 tanB = 1/2m-1, prove that A-B = π/4

Q.8 If tan A = x tan B prove that $\frac{\sin(A-B)}{\sin(A+B)} = \frac{x-1}{x+1}$

Q9 Prove that:

i) sin20.sin40.sin60.sin80 = 3/16
ii) cos20.cos40.cos60.cos80 = 1/16
iii) tan20.tan40.tan60.tan80 = 3
iv) sin10.sin30.sin50.sin70 = 1/16

Q.10 If cosA + cosB = 1/2 and sinA + sinB = 1/4, prove that tan(A+B/2)=1/2

Q.11 If $\tan\theta/2 = \sqrt{a - b/a\ a + b\ tan\ \varphi/2}$, Prove that $cos\theta = \frac{a\cos\varphi + b}{a + b\cos\varphi}$

Q.12 Prove that:

i) $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 8\theta}}} = 2\cos\theta$

ii) $\sqrt{3}$ cosec20 - sec20 = 4

iii) $\cot\frac{\pi}{24} = \sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}$

iv) $\tan\left(\frac{\pi}{4} + \theta\right) + \tan\left(\frac{\pi}{4} - \theta\right) = 2\sec 2\theta$

v) $\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)=\frac{1}{8}$

vi) $\frac{\cos\theta}{1+sin\theta}=\tan\left(\frac{\pi}{4}-\frac{\theta}{2}\right)$

vii) $\frac{1-cos2\theta+\sin 2\theta}{1+cos2\theta+sin2\theta}=\tan\theta$

viii) $cos^2A+cos^2\left(A+\frac{2\pi}{3}\right)+cos^2\left(A-\frac{2\pi}{3}\right)=\frac{3}{2}$

ix) $sin^2\left(\frac{\pi}{8}+\frac{A}{2}\right)-sin^2\left(\frac{\pi}{8}-\frac{A}{2}\right)=\frac{1}{\sqrt{2}\sin A}$

x) $\frac{1+sin2\theta+cos2\theta}{1+sin2\theta-cos2\theta}=cot\theta$

xi) $\frac{sec8\theta-1}{sec4\theta-1}=\frac{\tan 8\theta}{\tan 2\theta}$

xii) $\frac{\sin\theta+sin2\theta}{1+cos\theta+cos2\theta}=\tan\theta$

Q.13 Find the value of:

a) $sin\frac{\pi}{8}$	b) $cos\frac{\pi}{8}$	c) $tan\frac{\pi}{8}$
d) $sin\frac{\pi}{12}$	e) $cos\frac{\pi}{12}$	f) $tan\frac{\pi}{12}$
g) $sin\frac{\pi}{24}$	h) $cos\frac{\pi}{24}$	i) $tan\frac{\pi}{24}$
j) sin 18	k) cos 18	l) tan 18
m)sin 36	n) cos 36	o) tan 36
p)sin 54	q)cos 54	r) tan 54

Q.14 Prove: tanA + tan(60+A) – tan(60-A) = 3tan3A

Q.15 If $\tan^2\theta = 2\tan^2\varphi + 1$, Prove that: $\cos2\theta + \sin^2\varphi = 0$

Q.16 If $\cos(\alpha-\beta) + \cos(\beta-\gamma) + \cos(\gamma-\alpha) = -3/2$, prove that

$\cos\alpha + \cos\beta + \cos\gamma = \sin\alpha + \sin\beta + \sin\gamma = 0$

Q.17 If $\tan\beta = \frac{nsin\alpha cos\alpha}{1-nsin^2\alpha}$, prove that $\tan(\alpha-\beta) = (1-n)\tan\alpha$.

Q.18 Solve the equations: (General Solutions)

i)	$\cos\theta + \cos3\theta - 2\cos2\theta = 0$	$\theta = \frac{(2n+1)\pi}{4}$ or $2m\pi$
ii)	$2\cos^2\theta + 3\sin\theta = 0$	$\theta = \frac{n\pi + (-1)^{n+1}\pi}{6}$
iii)	$\tan\theta + \tan2\theta + \tan\theta\tan2\theta = 1$	$\theta = \frac{n\pi}{3} + \frac{\pi}{12}$
iv)	$7\cos^2\theta + 3\sin^2\theta = 4$	$\theta = \frac{n\pi\pm\pi}{3}$
v)	$\sqrt{3}\cos\theta + \sin\theta = \sqrt{2}$	$\theta = \frac{2n\pi+5\pi}{12}$
vi)	$\sqrt{2}\sec\theta + \tan\theta = 1$	$\theta = \frac{2n\pi-\pi}{4}$
vii)	$2\sin^2\theta + \sqrt{3}\cos\theta + 1 = 0$	$\theta = \frac{2n\pi\pm5\pi}{6}$