INDIANET GROUP

(NUTS 2 CRACK)

Date: _____	Sub.-Mathematics	Topic-Trigonometry
Time: _____	TARGET IIT	Batch - ____

1. If $\alpha+\beta+\gamma=\frac{\pi}{2}$, show that

$$\frac{\left(1-\tan\frac{\alpha}{2}\right)\left(1-\tan\frac{\beta}{2}\right)\left(1-\tan\frac{\gamma}{2}\right)}{\left(1+\tan\frac{\alpha}{2}\right)\left(1+\tan\frac{\beta}{2}\right)\left(1+\tan\frac{\gamma}{2}\right)}=\frac{\sin\alpha+\sin\beta+\sin\gamma-1}{\cos\alpha+\cos\beta+\cos\gamma}.$$

2. Prove that the inequality $(\cot^2 x -1)(3\cot^2 x - 1)(\cot 3x.\tan 2x - 1) \le -1$ is valid for all the values of x for which the LHS is defined.

3. Prove that

$$\operatorname{cosec} x.\operatorname{cosec} 2x.\sin 4x.\cos 6x.\operatorname{cosec} 10x=\frac{\cos 3x}{\sin 2x\sin 4x}+\frac{\cos 5x}{\sin 4x\sin 6x}+\frac{\cos 7x}{\sin 6x\sin 8x}+\frac{\cos 9x}{\sin 8x\sin 10x}$$

4. For $0<x<\frac{\pi}{4}$ prove that, $\frac{\cos x}{\sin^2 x(\cos x-\sin x)}>8.$

5. Prove that the value of cos A + cos B + cos C lies between 1 & $\frac{3}{2}$ where A+B+C = π.

6. Prove that from the equality $\frac{\sin^4\alpha}{a}+\frac{\cos^4\alpha}{b}=\frac{1}{a+b}$ follows the relation;

$$\frac{\sin^8\alpha}{a^3}+\frac{\cos^8\alpha}{b^3}=\frac{1}{(a+b)^3}.$$

7. Show that $\frac{2\sec\theta+3\tan\theta+5\sin\theta-7\cos\theta+5}{2\tan\theta+3\sec\theta+5\cos\theta+7\sin\theta+8}=\frac{1-\cos\theta}{\sin\theta}.$