Question 22:

$$\frac{\sec^2 54^\circ - \cot^2 36^\circ}{\operatorname{cosec}^2 57^\circ - \tan^2 33} + 2\sin^2 38^\circ \sec^2 52^\circ - \sin^2 45^\circ$$

$$= \frac{\sec^2 54^\circ - \cot^2 (90^\circ - 54^\circ)}{\operatorname{cosec}^2 57^\circ - \tan^2 (90^\circ - 57^\circ)} + 2\sin^2 38^\circ \sec^2 (90^\circ - 38^\circ) - \sin^2 45^\circ$$

$$= \frac{\sec^2 54^\circ - \tan^2 54^\circ}{\operatorname{cosec}^2 51^\circ - \cot^2 57^\circ} + 2\sin^2 38^\circ \operatorname{cosec}^2 38^\circ - \sin^2 45$$

$$= \frac{1}{1} + 2 \times 1 - \left(\frac{1}{\sqrt{2}}\right)^2 = 1 + 2 - \frac{1}{2} = \frac{5}{2}$$

Question 23:

$$\frac{\sec^2 (90^\circ - \theta) - \cot^2 \theta}{2\left(\sin^2 25^\circ + \sin^2 65^\circ\right)} + \frac{2\cos^2 60^\circ \tan^2 28^\circ \tan^2 62^\circ}{3\left(\sec^2 43^\circ - \cot^2 47^\circ\right)}$$

$$= \frac{\sec^2 (90^\circ - \theta) - \cot^2 \theta}{2\left[\sin^2 25^\circ + \sin^2 (90^\circ - 25^\circ)\right]} + \frac{2\cos^2 60^\circ \tan^2 28^\circ \tan^2 (90^\circ - 28^\circ)}{3\left[\sec^2 43^\circ - \cot^2 (90^\circ - 43^\circ)\right]}$$

$$= \frac{\operatorname{cosec}^2 \theta - \cot^2 \theta}{2\left(\sin^2 25^\circ + \cos^2 25^\circ\right)} + \frac{2\cos^2 60^\circ \tan^2 28^\circ \cot^2 28^\circ}{3\left(\sec^2 43^\circ - \tan^2 43^\circ\right)}$$

$$= \frac{1}{2 \times 1} + \frac{2\left(\frac{1}{2}\right)^2 \times \tan^2 28^\circ \times \frac{1}{\tan^2 28^\circ}}{3 \times 1}$$

$$= \frac{1}{2} + \frac{1}{2 \times 3} = \frac{1}{2} + \frac{1}{6} = \frac{3+1}{6} = \frac{4}{6} = \frac{2}{3}$$

********** END **********