



Question 24:

$$\begin{aligned}
 & \frac{\sec^2 \theta - \cot^2 (90^\circ - \theta)}{\operatorname{cosec}^2 67^\circ - \tan^2 23^\circ} + (\sin^2 40^\circ + \sin^2 50^\circ) \\
 &= \frac{\sec^2 \theta - \tan^2 \theta}{\operatorname{cosec}^2 67^\circ - \tan^2 (90^\circ - 67^\circ)} + [\sin^2 40^\circ + \sin^2 (90^\circ - 40^\circ)] \\
 &= \frac{1}{\operatorname{cosec}^2 67^\circ - \cot^2 67^\circ} + (\sin^2 40^\circ + \cos^2 40^\circ) \\
 &= \frac{1}{1} + 1 = 2 \\
 & \quad [\because \sec^2 \theta - \tan^2 \theta = 1, \tan^2 (90^\circ - \theta) = \cot^2 \theta]
 \end{aligned}$$

Question 25:

$$\begin{aligned}
 & \frac{\sec^2 54^\circ - \cot^2 36^\circ}{\operatorname{cosec}^2 57^\circ - \tan^2 33^\circ} + 2 \sin^2 38^\circ \sec^2 52^\circ - \sin^2 45^\circ \\
 &= \frac{\sec^2 (90^\circ - 36^\circ) - \cot^2 36^\circ}{\operatorname{cosec}^2 (90^\circ - 33^\circ) - \tan^2 33^\circ} + 2 \sin^2 38^\circ \sec^2 (90^\circ - 38^\circ) - \left(\frac{1}{\sqrt{2}}\right)^2 \\
 &= \frac{\operatorname{cosec}^2 36^\circ - \cot^2 36^\circ}{\sec^2 33^\circ - \tan^2 33^\circ} + 2 \sin^2 38^\circ \operatorname{cosec}^2 38^\circ - \frac{1}{2} \\
 & \quad \left[\text{Now, } 1 + \cot^2 \theta = \operatorname{cosec}^2 \theta \therefore \operatorname{cosec}^2 - \cot^2 \theta = 1 \right]
 \end{aligned}$$

$$\text{Similarly, } \sec^2 \theta - \tan^2 \theta = 1, \sin \theta \operatorname{cosec} \theta = \sin \theta \times \frac{1}{\sin \theta} = 1$$

$$= \frac{1}{1} + 2 \times 1 - \frac{1}{2} = 3 - \frac{1}{2} = \frac{5}{2}$$

***** END *****