

NCERT Maths Solutions by Dev Anoop (Bathinda) Ex 8.4

$$\begin{aligned}
 5 \text{ (vi)} &= \overset{\text{LHS}}{(\sin A + \operatorname{cosec} A)^2 + (\cos A + \operatorname{sec} A)^2} \\
 &= \sin^2 A + \operatorname{cosec}^2 A + 2 \sin A \operatorname{cosec} A + \cos^2 A + \operatorname{sec}^2 A + 2 \cos A \operatorname{sec} A \\
 & \quad \left[\operatorname{cosec} A = \frac{1}{\sin A}, \operatorname{sec} A = \frac{1}{\cos A} \right] \\
 &= \sin^2 A + \cos^2 A + 1 + \cot^2 A + 1 + \tan^2 A + 2 + 2 \\
 &= 1 + 1 + \cot^2 A + 1 + \tan^2 A + 2 + 2 \\
 &= 7 + \tan^2 A + \cot^2 A \\
 &= \text{RHS}
 \end{aligned}$$

$$\begin{aligned}
 5 \text{ (vii)} \quad \text{LHS} &= \frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} \\
 &= \frac{\sin \theta (1 - 2 \sin^2 \theta)}{\cos \theta (2 \cos^2 \theta - 1)} \\
 &= \tan \theta \left[\frac{\sin^2 \theta + \cos^2 \theta - 2 \sin^2 \theta}{2 \cos^2 \theta - \sin^2 \theta - \cos^2 \theta} \right] \\
 &= \tan \theta \left[\frac{\cos^2 \theta - \sin^2 \theta}{\cos^2 \theta - \sin^2 \theta} \right] \\
 &= \tan \theta \\
 &= \text{RHS}
 \end{aligned}$$

$$\begin{aligned}
 5 \text{ (ix)} \quad &(\operatorname{cosec} A - \sin A)(\operatorname{sec} A - \cos A) \\
 &= \left(\frac{1}{\sin A} - \sin A \right) \left(\frac{1}{\cos A} - \cos A \right) \\
 &= \frac{1 - \sin^2 A}{\sin A} \times \frac{1 - \cos^2 A}{\cos A} \\
 &= \frac{\cos^2 A \times \sin^2 A}{\sin A \cos A} \\
 &= \sin A \cos A \\
 &= \frac{1}{\frac{1}{\sin A \cos A}} \\
 &= \frac{1}{\sin A \cos A} \\
 &= \frac{1}{\sin^2 A + \cos^2 A} \\
 &= \frac{1}{\sin A \cos A} + \frac{\cos^2 A}{\sin A \cos A} \\
 &= \frac{1}{\tan A + \cot A} \\
 &= \text{RHS}
 \end{aligned}$$