(viii) $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2$

$= \sin^2 A + \operatorname{cosec}^2 A + 2 \sin A \cdot \operatorname{cosec} A + \cos^2 A + \sec^2 A + 2 \cos A \cdot \sec A$

$= (\sin^2 A + \cos^2 A) + \operatorname{cosec}^2 A + \sec^2 A + 2 + 2$

[sin A . cosec A = 1 and sec A . cos A = 1]

$= 1 + \operatorname{cosec}^2 A + \sec^2 A + 4$

[$\because \sin^2 A + \cos^2 A = 1$]

$= 5 + (1 + \cot^2 A) + (1 \tan^2 A)$

[$\because \operatorname{cosec}^2 A = 1 + \cot^2 A$ and $\sec^2 A = 1 + \tan^2 A$]

$= 7 + \cot^2 A + \tan^2 A$

$=$ R.H.S.

(ix) L.H.S. $= (\operatorname{cosec} A - \sin A)(\sec A - \cos A)$

$$= \left(\frac{1}{\sin A} - \sin A\right)\left(\frac{1}{\cos A} - \cos A\right)$$

$$= \left(\frac{1-\sin^2 A}{\sin A}\right)\left(\frac{1-\cos^2 A}{\cos A}\right)$$

$$= \frac{\cos^2 A \times \sin^2 A}{\sin A \cos A}$$ [$\because 1 - \sin^2 A = \cos^2 A$ and $1 - \cos^2 A = \sin^2 A$]

$$= \sin A.\cos A = \frac{\sin A.\cos A}{1}$$

$$= \frac{\sin A.\cos A}{\sin^2 A + \cos^2 A}$$ [$\because 1 = \sin^2 A + \cos^2 A$]

$$= \frac{\frac{\sin A \cos A}{\sin A \cos A}}{\frac{\sin^2 A}{\sin A \cos A} + \frac{\cos^2 A}{\sin A \cos A}}$$ [Dividing num. and den. by sin A cos A]

$$= \frac{1}{\frac{\sin^2 A}{\sin A \cos A}} = \frac{1}{\tan A + \cot A}$$

$=$ R.H.S.

(x) L.H.S. $= \left(\frac{1+\tan^2 A}{1+\cot^2 A}\right)$

$$= \frac{1+\tan^2 A}{1+\frac{1}{\tan^2 A}}$$ $\left[\because \cot A = \frac{1}{\tan A}\right]$

$$= \frac{1+\tan^2 A}{\frac{\tan^2 A+1}{\tan^2 A}} = \frac{1+\tan^2 A}{1} \times \frac{\tan^2 A}{1+\tan^2 A}$$

$= \tan^2 A =$ R.H.S.

Also, $\left[\frac{1-\tan A}{1-\cot A}\right]^2 = \left[\frac{1-\tan A}{1-\frac{1}{\tan A}}\right]^2$

$= \left[\frac{1-\tan A}{\frac{\tan A-1}{\tan A}}\right]^2 = \left[\frac{1-\tan A}{\frac{-(1-\tan A)}{\tan A}}\right]$

$= \left[\frac{(1-\tan A)}{1} \times \frac{-\tan A}{(1-\tan A)}\right]^2$

$= (-\tan A)^2 = \tan^2 A$ = R.H.S.

From (1) and (2), we have L.H.S. = R.H.S.