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(Affiliated to CBSE up to +2 Level)

CLASS: X

SUB.: MATHS (NCERT BASED)

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

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

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

$$[\sin A \cdot \operatorname{cosec} A = 1 \text{ and } \sec A \cdot \cos A = 1]$$

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

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

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

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

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

$$= \text{R.H.S.}$$

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

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

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

$$= \frac{\cos^2 A \times \sin^2 A}{\sin A \cos A}$$

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

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

$$= \frac{\sin A \cdot \cos A}{\sin^2 A + \cos^2 A}$$

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

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

$$[\text{Dividing num. and den. by } \sin A \cos A]$$

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

$$= \text{R.H.S.}$$

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

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

$$[\because \cot A = \frac{1}{\tan A}]$$

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

$$= \tan^2 A = \text{R.H.S.}$$

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

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

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

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

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