Trigonometric Ratios of Compound Angles Ex 7.1 Q11

LHS: $\dfrac{\cos 11° + \sin 11°}{\cos 11° - \sin 11°}$

Dividing numerator and denominator by $\cos 11°$, we get

$$\frac{\frac{\cos 11°}{\cos 11°} + \frac{\sin 11°}{\cos 11°}}{\frac{\cos 11°}{\cos 11°} - \frac{\sin 11°}{\cos 11°}}$$

$$= \frac{1 + \tan 11°}{1 - \tan 11°} \qquad \left[\because \tan\theta = \frac{\sin\theta}{\cos\theta}\right]$$

$$= \frac{\tan 45° + \tan 11°}{1 - \tan 45° \times \tan 11°} \qquad [\tan 45° = 1]$$

$$= \tan(45° + 11°) \qquad \left[\because \tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}\right]$$

$$= \tan 56°$$

$\therefore \quad \dfrac{\cos 11° + \sin 11°}{\cos 11° - \sin 11°} = \tan 56°$

Hence proved.

LHS: $\dfrac{\cos 9° + \sin 9°}{\cos 9° - \sin 9°}$

$$\frac{\frac{\cos 9°}{\cos 9°} + \frac{\sin 9°}{\cos 9°}}{\frac{\cos 9°}{\cos 9°} - \frac{\sin 9°}{\cos 9°}} \qquad \left[\begin{array}{l}\text{Dividing numerator and}\\ \text{denominator by } \cos 9°\end{array}\right]$$

$$= \frac{1 + \tan 9°}{1 - \tan 9°} \qquad \left[\because \tan\theta = \frac{\sin\theta}{\cos\theta}\right]$$

$$= \frac{\tan 45° + \tan 9°}{1 - \tan 45° \times \tan 9°} \qquad [\tan 45° = 1]$$

$$= \tan(45° + 9°) \qquad \left[\because \tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}\right]$$

$$= \tan 54°$$

$$= \text{RHS}$$

$\therefore \quad$ LHS = RHS

Hence proved.

LHS: $\dfrac{\cos 8° - \sin 8°}{\cos 8° + \sin 8°}$

$$\dfrac{\dfrac{\cos 8°}{\cos 8°} - \dfrac{\sin 8°}{\cos 8°}}{\dfrac{\cos 8°}{\cos 8°} + \dfrac{\sin 8°}{\cos 8°}} \qquad \left[\begin{array}{l}\text{Dividing numerator and} \\ \text{denominator by } \cos 8°\end{array}\right]$$

$$= \dfrac{1 - \tan 8°}{1 + \tan 8°} \qquad \left[\because \tan\theta = \dfrac{\sin\theta}{\cos\theta}\right]$$

$$= \dfrac{\tan 45° - \tan 8°}{1 + \tan 45° \times \tan 8°} \qquad [\tan 45° = 1]$$

$$= \tan(45° - 8°) \qquad \left[\because \tan(A - B) = \dfrac{\tan A - \tan B}{1 + \tan A \tan B}\right]$$

$$= \tan 37°$$

$$= \text{RHS}$$

$\therefore$ LHS = RHS

Hence proved.

Trigonometric Ratios of Compound Angles Ex 7.1 Q12

LHS: $\sin(60° - \theta)\cos(30° + \theta) + \cos(60° - \theta) \times \sin(30° + \theta)$

$$= \sin[(60° - \theta) + (30° + \theta)] \qquad [\sin(A + B) = \sin A \cos B + \cos A \sin B]$$

$$= \sin[60° - \theta + 30° + \theta]$$

$$= \sin(90°)$$

$$= 1$$

$$= \text{RHS}$$

$\therefore$ LHS = RHS

Hence proved.

Trigonometric Ratios of Compound Angles Ex 7.1 Q13

LHS: $\dfrac{\tan 69° + \tan 66°}{1 - \tan 69° \tan 66°}$

$$= \tan(69° + 66°) \qquad \left[\because \tan(A + B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}\right]$$

$$= \tan(135°)$$

$$= \tan(90° + 45°)$$

$$= -\cot 45° \qquad [\because \tan\theta \text{ is negative in second quadrant}]$$

$$= -1$$

$$= \text{RHS}$$

$\therefore$ LHS = RHS

Hence proved.

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