Transformation Formulae Ex 8.2 Q4(i)

We have,

$$\text{LHS} = \cos\left(\frac{3\pi}{4}+x\right)-\cos\left(\frac{3\pi}{4}-x\right)$$

$$= -\left[\cos\left(\frac{3\pi}{4}-x\right)-\cos\left(\frac{3\pi}{4}+x\right)\right]$$

$$= -\left[2\sin\frac{3\pi}{4}\sin x\right] \qquad \left[\because \cos(A-B)-\cos(A+B) = 2\sin A\sin B\right]$$

$$= -2\sin\frac{3\pi}{4}\sin x$$

$$= -2\sin\left(\frac{\pi}{2}+\frac{\pi}{4}\right)\sin x$$

$$= -2\cos\frac{\pi}{4}\sin x$$

$$= -2\times\frac{1}{\sqrt{2}}\times\sin x$$

$$= -\frac{\sqrt{2}\times\sqrt{2}}{\sqrt{2}}\sin x$$

$$= -\sqrt{2}\sin x$$

$$= \text{RHS}$$

$\therefore \cos\left(\frac{3\pi}{4}+x\right)-\cos\left(\frac{3\pi}{4}-x\right) = -\sqrt{2}\sin x$ Hence proved.

Transformation Formulae Ex 8.2 Q4(ii)

We have,

$$\text{LHS} = \cos\left(\frac{\pi}{4}+x\right)+\cos\left(\frac{\pi}{4}-x\right)$$

$$= 2\cos\frac{\pi}{4}\cos x \qquad \left[\because \cos(A+B)+\cos(A-B) = 2\cos A\cos B\right]$$

$$= 2\times\frac{1}{\sqrt{2}}\times\cos x$$

$$= \frac{\sqrt{2}\times\sqrt{2}}{\sqrt{2}}\cos x$$

$$= \sqrt{2}\cos x$$

$$= \text{RHS}$$

$\therefore \cos\left(\frac{\pi}{4}+x\right)+\cos\left(\frac{\pi}{4}-x\right) = \sqrt{2}\cos x.$

Transformation Formulae Ex 8.2 Q5(i)

We have,

$$\text{LHS} = \sin 65^\circ + \cos 65^\circ$$

$$= \sin(45^\circ+20^\circ)+\cos(90^\circ-25^\circ)$$

$$= \sin(45^\circ+20^\circ)+\sin 25^\circ$$

$$= \sin(45^\circ+20^\circ)+\sin(45^\circ-20^\circ)$$

$$= 2\sin 45^\circ\cos 20^\circ$$

$$= 2\times\frac{1}{\sqrt{2}}\cos 20^\circ$$

$$= \frac{\sqrt{2}\times\sqrt{2}}{\sqrt{2}}\times\cos 20^\circ$$

$$= \sqrt{2}\cos 20^\circ$$

$$= \text{RHS}$$

$\therefore \sin 65^\circ + \cos 65^\circ = \sqrt{2}\cos 20^\circ$ Hence proved.

Transformation Formulae Ex 8.2 Q5(ii)

We have,

$$\begin{aligned}
\text{LHS} &= \sin 47^\circ + \cos 77^\circ \\
&= \sin\left(90^\circ - 43^\circ\right) + \cos 77^\circ \\
&= \cos 43^\circ + \cos 77^\circ \\
&= \cos\left(60^\circ - 17^\circ\right) + \cos\left(60^\circ + 17^\circ\right) \\
&= 2\cos 60^\circ \cos 17^\circ \\
&= 2 \times \frac{1}{2} \times \cos 17^\circ \\
&= \cos 17^\circ \\
&= \text{RHS}
\end{aligned}$$

$\therefore \quad \sin 47^\circ + \cos 77^\circ = \cos 17^\circ$ Hence proved.

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