Exercise 8

Question 1:

(i)

$$\frac{\sin 16^\circ}{\cos 74^\circ} = \frac{\sin(90^\circ - 74^\circ)}{\cos 74^\circ} = \frac{\cos 74^\circ}{\cos 74^\circ} = 1$$

$$\left[\because \sin(90^\circ - \theta) = \cos\theta\right]$$

(ii)

$$\frac{\sec 11^\circ}{\operatorname{cosec} 79^\circ} = \frac{\sec(90^\circ - 79^\circ)}{\operatorname{cosec} 79^\circ} = \frac{\operatorname{cosec} 79^\circ}{\operatorname{cosec} 79^\circ} = 1$$

(iii)

$$\frac{\tan 27^\circ}{\cot 63^\circ} = \frac{\tan(90^\circ - 63^\circ)}{\cot 63^\circ} = \frac{\cot 63^\circ}{\cot 63^\circ} = 1$$

$$\left[\because \tan(90^\circ - \theta) = \cot\theta\right]$$

(iv)

$$\frac{\cos 35^\circ}{\sin 55^\circ} = \frac{\cos 35^\circ}{\sin(90^\circ - 35^\circ)} = \frac{\cos 35^\circ}{\cos 35^\circ} = 1$$

(v)

$$\frac{\operatorname{cosec} 42^\circ}{\sec 48^\circ} = \frac{\operatorname{cosec} 42^\circ}{\sec(90^\circ - 42^\circ)} = \frac{\operatorname{cosec} 42^\circ}{\operatorname{cosec} 42^\circ} = 1$$

(vi)

$$\frac{\cot 38^\circ}{\tan 52^\circ} = \frac{\cot 38^\circ}{\tan(90^\circ - 38^\circ)} = \frac{\cot 38^\circ}{\cot 38^\circ} = 1$$

Question 2:

(i)

$$\sin\theta\cos(90^\circ - \theta) + \sin(90^\circ - \theta)\cos\theta \qquad \left[\because \cos(90^\circ - \theta) = \sin\theta \text{ and } \sin\theta(90^\circ - \theta) = \cos\theta\right]$$

$$\sin^2\theta + \cos^2\theta = 1$$

∴ LHS = RHS

(ii)

$$\text{LHS} = \frac{\sin\theta}{\cos(90^\circ - \theta)} + \frac{\cos\theta}{\sin(90^\circ - \theta)}$$

$$\left[\because \sin(90^\circ - \theta) = \cos\theta \text{ and } \cos(90^\circ - \theta) = \sin\theta\right]$$

$$\Rightarrow \frac{\sin\theta}{\sin\theta} + \frac{\cos\theta}{\cos\theta} = 1 + 1 + 2 = \text{RHS}$$

∴ LHS = RHS

(iii)

$$\text{LHS} = \frac{\sin\theta\cos(90^\circ-\theta)\cos\theta}{\sin(90^\circ-\theta)} + \frac{\cos\theta\sin(90^\circ-\theta)\sin\theta}{\cos(90^\circ-\theta)}$$

$$\left[\because \cos(90^\circ-\theta) = \sin\theta \text{ and } \sin(90^\circ-\theta) = \cos\theta\right]$$

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

$$= \sin^2\theta + \cos^2\theta = 1 = \text{RHS}$$

$\therefore$ LHS = RHS

(iv)

$$\left[\because \cos(90^\circ-q) = \sin q, \sec(90^\circ-q) = \operatorname{cosec} q \text{ etc}\right]$$

$$\text{LHS} = \frac{\cos(90^\circ-\theta)\sec(90^\circ-\theta)\tan\theta}{\operatorname{cosec}(90^\circ-\theta)\sin(90^\circ-\theta)\cot(90^\circ-\theta)} + \frac{\tan(90^\circ-\theta)}{\cot\theta} = \frac{\sin\theta\operatorname{cosec}\theta\tan\theta}{\sec\theta\cos\theta\tan\theta} + \frac{\cot\theta}{\cot\theta}$$

$$= \frac{\sin\theta \times \frac{1}{\sin\theta}}{\frac{1}{\cos\theta} \times \cos\theta} + 1 = \frac{1}{1} + 1 = 2 = \text{RHS}$$

$\therefore$ LHS = RHS

(v)

$$\text{LHS} = \frac{\cos(90^\circ-\theta)}{1+\sin(90^\circ-\theta)} + \frac{1+\sin(90^\circ-\theta)}{\cos(90^\circ-\theta)}$$

$$\left[\because \sin(90^\circ-\theta) = \cos\theta \text{ and } \cos(90^\circ-\theta) = \sin\theta\right]$$

$$= \frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = \frac{\sin^2\theta + (1+\cos\theta)^2}{(1+\cos\theta)\sin\theta}$$

$$= \frac{\sin^2\theta + 1 + \cos^2\theta + 2\cos\theta}{(1+\cos\theta)\sin\theta} = \frac{1+1+2\cos\theta}{(1+\cos\theta)\sin\theta}$$

$$= \frac{2(1+\cos\theta)}{(1+\cos\theta)\sin\theta} = \frac{2}{\sin\theta} = 2\operatorname{cosec}\theta$$

$\therefore$ LHS = RHS

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