Question 6:

(i)

$$\text{LHS} = \tan 35^\circ \tan 40^\circ \tan 45^\circ \tan 50^\circ \tan 55^\circ$$
$$= \tan 35^\circ \tan 40^\circ \tan 45^\circ \tan(90^\circ - 40^\circ)\tan(90^\circ - 35^\circ)$$
$$= \tan 35^\circ \tan 40^\circ \tan 45^\circ \cot 40^\circ \cot 35^\circ$$
$$= \left(\tan 35^\circ \times \frac{1}{\tan 35^\circ}\right) \times \left(\tan 40^\circ \times \frac{1}{\tan 40^\circ}\right) \times \tan 45^\circ$$
$$= 1 \times 1 \times 1 = 1 = \text{RHS}$$

$\therefore$ LHS = RHS

(ii)

$$\text{LHS} = \tan 1^\circ \tan 10^\circ \tan 20^\circ \tan 70^\circ \tan 80^\circ \tan 89^\circ$$
$$= \tan 1^\circ \tan 10^\circ \tan 20^\circ \tan(90^\circ - 20^\circ)\tan(90^\circ - 10^\circ)\tan(90^\circ - 1^\circ)$$
$$= \tan 1^\circ \tan 10^\circ \tan 20^\circ \cot 20^\circ \cot 10^\circ \cot 1^\circ$$
$$= \tan 1^\circ \tan 10^\circ \tan 20^\circ \times \frac{1}{\tan 20^\circ} \times \frac{1}{\tan 10^\circ} \times \frac{1}{\tan 1^\circ}$$
$$= 1 = \text{RHS}$$

$\therefore$ LHS = RHS

(iii)

$$\text{LHS} = \tan 5^\circ \tan 25^\circ \tan 30^\circ \tan 65^\circ \tan 85^\circ$$
$$= \tan 5^\circ \tan 25^\circ \times \tan 30^\circ \tan(90^\circ - 25^\circ)\tan(90^\circ - 30^\circ)$$
$$= \tan 5^\circ \tan 25^\circ \times \tan 30^\circ \times \cot 25^\circ \cot 5^\circ$$
$$= \tan 5^\circ \tan 25^\circ \times \frac{1}{\sqrt{3}} \times \frac{1}{\tan 25^\circ} \times \frac{1}{\tan 5^\circ} = \frac{1}{\sqrt{3}}$$
$$= \text{RHS}$$

$\therefore$ LHS = RHS

(iv) $\text{LHS} = \cot 10^\circ \cot 20^\circ \cot 60^\circ \cot 70^\circ \cot^\circ$

$$= \cot 10^\circ \cot 20^\circ \cot 60^\circ \cot(90^\circ - 20^\circ)\cot(90^\circ - 10^\circ)$$
$$= \cot 10^\circ \cot 20^\circ \cot 60^\circ \tan 20^\circ \tan 10^\circ$$
$$= \frac{1}{\tan 10^\circ} \times \frac{1}{\tan 20^\circ} \times \frac{1}{\sqrt{3}} \times \tan 20^\circ \times \tan 10^\circ = \frac{1}{\sqrt{3}}$$
$$= \text{RHS}$$

$\therefore$ LHS = RHS

(v) $\text{cosec}15^\circ \text{cosec}355^\circ \text{cosec}55^\circ \text{cosec}60^\circ \text{cosec}75^\circ$

$$= \cos 15^\circ \cos 35^\circ \text{cosec}(90^\circ - 35^\circ)\cos 60^\circ \text{cosec}(90^\circ - 15^\circ)$$
$$= \cos 15^\circ \cos 35^\circ \sec 35^\circ \cos 60^\circ \sec 15^\circ$$
$$= \cos 15^\circ \cos 35^\circ \times \frac{1}{\cos 35^\circ} \times \frac{1}{2} \times \frac{1}{\cos 15^\circ} = \frac{1}{2} = \text{RHS}$$

$\therefore$ LHS = RHS

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