Question 9:

On substituting the value of various T-ratios, we get

$$\frac{\sin 30°}{\cos 45°} + \frac{\cot 45°}{\sec 60°} - \frac{\sin 60°}{\tan 45°} - \frac{\cos 30°}{\sin 90°}$$

$$= \frac{\left(\frac{1}{2}\right)}{\left(\frac{1}{\sqrt{2}}\right)} + \frac{1}{\left(\frac{2}{1}\right)} - \frac{\left(\frac{\sqrt{3}}{2}\right)}{1} - \frac{\left(\frac{\sqrt{3}}{2}\right)}{1}$$

$$= \frac{\sqrt{2}}{2} + \frac{1}{2} - \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} = \frac{\sqrt{2} + 1 - \sqrt{3} - \sqrt{3}}{2}$$

$$= \left(\frac{\sqrt{2} + 1 - 2\sqrt{3}}{2}\right)$$

Question 10:

$$\text{L.H.S.} = \frac{1 - \sin 60^\circ}{\cos 60^\circ} = \frac{1 - \frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{2 - \sqrt{3}}{1}$$

$$\text{R.H.S.} = \frac{\tan 60^\circ - 1}{\tan 60^\circ + 1} = \frac{\sqrt{3} - 1}{\sqrt{3} + 1} \times \frac{\sqrt{3} - 1}{\sqrt{3} - 1}$$

$$= \frac{\left(\sqrt{3} - 1\right)^2}{\left(\sqrt{3}\right)^2 - (1)^2}$$

$$= \frac{3 + 1 - 2\sqrt{3}}{3 - 1}$$

$$= \frac{4 - 2\sqrt{3}}{2}$$

$$= \frac{2\left(2 - \sqrt{3}\right)}{2}$$

$$= \left(2 - \sqrt{3}\right)$$

L.H.S. = R.H.S.

Hence, $\dfrac{1 - \sin 60^\circ}{\cos 60^\circ} = \dfrac{\tan 60^\circ - 1}{\tan 60^\circ + 1}$

(ii)

$$\text{L.H.S.} = \frac{\cos 30^\circ + \sin 60^\circ}{1 + \sin 30^\circ + \cos 60^\circ} = \frac{\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2}}{1 + \frac{1}{2} + \frac{1}{2}} = \frac{\sqrt{3}}{2}$$

$$\text{R.H.S.} = \cos 30^\circ = \frac{\sqrt{3}}{2}$$

L.H.S = R.H.S.

hence, $\dfrac{\cos 30^\circ + \sin 60^\circ}{1 + \sin 30^\circ + \cos 60^\circ} = \cos 30^\circ$

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