



Trigonometric Ratios Ex 5.3 Q9

Answer :

We have to evaluate the following values-

(i) We will use the values of known angles of different trigonometric ratios.

$$\begin{aligned} &= \frac{2}{3}(\cos^4 30^\circ - \sin^4 45^\circ) - 3(\sin^2 60^\circ - \sec^2 45^\circ) + \frac{1}{4}\cot^2 30^\circ \\ &= \frac{2}{3}\left(\frac{9}{16} - \frac{1}{4}\right) - 3\left(\frac{3}{4} - 2\right) + \frac{1}{4}(3) \\ &= \frac{2}{3}\left(\frac{5}{16}\right) + 3\left(\frac{5}{4}\right) + \frac{3}{4} \\ &= \boxed{\frac{113}{24}} \end{aligned}$$

(ii) We will use the values of known angles of different trigonometric ratios.

$$\begin{aligned} &= 4(\sin^4 30^\circ + \cos^4 60^\circ) - \frac{2}{3}(\sin^2 60^\circ - \cos^2 45^\circ) + \frac{1}{2}\tan^2 60^\circ \\ &= 4\left(\frac{1}{16} + \frac{1}{16}\right) - \frac{2}{3}\left(\frac{3}{4} - \frac{1}{2}\right) + \frac{1}{2}(3) \\ &= 4\left(\frac{1}{8}\right) - \frac{2}{3}\left(\frac{1}{4}\right) + \frac{3}{2} \\ &= \boxed{\frac{11}{6}} \end{aligned}$$

(iii) We will use the properties of complementary angles.

$$\begin{aligned}
 &= \frac{\sin 50^\circ}{\cos 40^\circ} + \frac{\csc 40^\circ}{\sec 50^\circ} - 4 \cos 50^\circ \csc 40^\circ \\
 &= \frac{\sin 50^\circ}{\sin 50^\circ} + \frac{\csc 40^\circ}{\csc 40^\circ} - 4 \frac{\cos 50^\circ}{\cos 50^\circ} \\
 &= 1 + 1 - 4 \\
 &= \boxed{-2}
 \end{aligned}$$

(iv) We will use the properties of complementary angles.

$$\begin{aligned}
 &= \tan 35^\circ \tan 40^\circ \tan 45^\circ \tan 50^\circ \tan 55^\circ \\
 &= \cot 55^\circ \cot 50^\circ \tan 45^\circ \tan 50^\circ \tan 55^\circ \\
 &= \boxed{1}
 \end{aligned}$$

(v) We will use the properties of complementary angles.

$$\begin{aligned}
 &= \csc(65^\circ + \theta) - \sec(25^\circ - \theta) - \tan(55^\circ - \theta) + \cot(35^\circ + \theta) \\
 &= \csc(65^\circ + \theta) - \csc(65^\circ + \theta) - \tan(55^\circ - \theta) + \tan(55^\circ - \theta) \\
 &= \boxed{0}
 \end{aligned}$$

(vi) We will use the properties of complementary angles.

$$\begin{aligned}
 &= \tan 7^\circ \tan 23^\circ \tan 60^\circ \tan 67^\circ \tan 83^\circ \\
 &= \cot 83^\circ \cot 67^\circ \tan 60^\circ \tan 67^\circ \tan 83^\circ \\
 &= \boxed{\sqrt{3}}
 \end{aligned}$$

(vii) We will use the properties of complementary angles.

$$\begin{aligned}
 &= \frac{2 \sin 68^\circ}{\cos 22^\circ} - \frac{2 \cot 15^\circ}{5 \tan 75^\circ} - \frac{3 \tan 45^\circ \tan 20^\circ \tan 40^\circ \tan 50^\circ \tan 70^\circ}{5} \\
 &= \frac{2 \sin 68^\circ}{\sin 68^\circ} - \frac{2 \cot 15^\circ}{5 \cot 15^\circ} - \frac{3 \tan 45^\circ \cot 70^\circ \cot 50^\circ \tan 50^\circ \tan 70^\circ}{5} \\
 &= 2 - \frac{2}{5} - \frac{3}{5} \\
 &= \boxed{1}
 \end{aligned}$$

(viii) We will use the properties of complementary angles.

$$\begin{aligned}
 &= \frac{3 \cos 55^\circ}{7 \sin 35^\circ} - \frac{4(\cos 70^\circ \csc 20^\circ)}{7(\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ)} \\
 &= \frac{3 \cos 55^\circ}{7 \cos 55^\circ} - \frac{4(\cos 70^\circ \sec 70^\circ)}{7(\cot 85^\circ \cot 65^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ)} \\
 &= \frac{3}{7} - \frac{4}{7} \\
 &= \boxed{-\frac{1}{7}}
 \end{aligned}$$

(ix) We will use the properties of complementary angles.

$$\begin{aligned}
 &= \frac{\sin 18^\circ}{\sin 72^\circ} + \sqrt{3}(\tan 10^\circ \tan 30^\circ \tan 40^\circ \tan 50^\circ \tan 80^\circ) \\
 &= \frac{\sin 18^\circ}{\sin 18^\circ} + \sqrt{3}(\cot 80^\circ \tan 30^\circ \cot 50^\circ \tan 50^\circ \tan 80^\circ)
 \end{aligned}$$

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

$$= \boxed{2}$$

(x) We will use the properties of complementary angles.

$$= \frac{\cos 58^\circ}{\sin 32^\circ} + \frac{\sin 22^\circ}{\cos 68^\circ} - \frac{\cos 38^\circ \csc 52^\circ}{\tan 18^\circ \tan 35^\circ \tan 60^\circ \tan 72^\circ \tan 55^\circ}$$

$$= \frac{\cos 58^\circ}{\cos 58^\circ} + \frac{\sin 22^\circ}{\sin 22^\circ} - \frac{\cos 38^\circ \sec 38^\circ}{\cot 72^\circ \cot 55^\circ \tan 60^\circ \tan 72^\circ \tan 55^\circ}$$

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

$$= \boxed{\frac{6 - \sqrt{3}}{3}}$$

***** END *****