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.

$$=\frac{2}{3}\left(\cos^4 30^0-\sin^4 45^0\right)-3\left(\sin^2 60^0-\sec^2 45^0\right)+\frac{1}{4}\cot^2 30^0$$

$$=\frac{2}{3}\left(\frac{9}{16}-\frac{1}{4}\right)-3\left(\frac{3}{4}-2\right)+\frac{1}{4}(3)$$

$$=\frac{2}{3}\left(\frac{5}{16}\right)+3\left(\frac{5}{4}\right)+\frac{3}{4}$$

$$=\boxed{\frac{113}{24}}$$

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

$$=4\left(\sin^4 30^0+\cos^4 60^0\right)-\frac{2}{3}\left(\sin^2 60^0-\cos^2 45^0\right)+\frac{1}{2}\tan^2 60^0$$

$$=4\left(\frac{1}{16}+\frac{1}{16}\right)-\frac{2}{3}\left(\frac{3}{4}-\frac{1}{2}\right)+\frac{1}{2}(3)$$

$$=4\left(\frac{1}{8}\right)-\frac{2}{3}\left(\frac{1}{4}\right)+\frac{3}{2}$$

$$=\boxed{\frac{11}{6}}$$

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

$$= \frac{\sin 50^0}{\cos 40^0} + \frac{\csc 40^0}{\sec 50^0} - 4\cos 50^0 \csc 40^0$$

$$= \frac{\sin 50^0}{\sin 50^0} + \frac{\csc 40^0}{\csc 40^0} - 4\frac{\cos 50^0}{\cos 50^0}$$

$$= 1 + 1 - 4$$

$$= \boxed{-2}$$

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

$$= \tan 35^0 \tan 40^0 \tan 45^0 \tan 50^0 \tan 55^0$$

$$= \cot 55^0 \cot 50^0 \tan 45^0 \tan 50^0 \tan 55^0$$

$$= \boxed{1}$$

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

$$= \csc\left(65^0 + \theta\right) - \sec\left(25^0 - \theta\right) - \tan\left(55^0 - \theta\right) + \cot\left(35^0 + \theta\right)$$

$$= \csc\left(65^0 + \theta\right) - \csc\left(65^0 + \theta\right) - \tan\left(55^0 - \theta\right) + \tan\left(55^0 - \theta\right)$$

$$= \boxed{0}$$

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

$$= \tan 7^0 \tan 23^0 \tan 60^0 \tan 67^0 \tan 83^0$$

$$= \cot 83^0 \cot 67^0 \tan 60^0 \tan 67^0 \tan 83^0$$

$$= \boxed{\sqrt{3}}$$

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

$$= \frac{2\sin 68^0}{\cos 22^0} - \frac{2\cot 15^0}{5\tan 75^0} - \frac{3\tan 45^0 \tan 20^0 \tan 40^0 \tan 50^0 \tan 70^0}{5}$$

$$= \frac{2\sin 68^0}{\sin 68^0} - \frac{2\cot 15^0}{5\cot 15^0} - \frac{3\tan 45^0 \cot 70^0 \cot 50^0 \tan 50^0 \tan 70^0}{5}$$

$$= 2 - \frac{2}{5} - \frac{3}{5}$$

$$= \boxed{1}$$

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

$$= \frac{3\cos 55^0}{7\sin 35^0} - \frac{4\left(\cos 70^0 \csc 20^0\right)}{7\left(\tan 5^0 \tan 25^0 \tan 45^0 \tan 65^0 \tan 85^0\right)}$$

$$= \frac{3\cos 55^0}{7\cos 55^0} - \frac{4\left(\cos 70^0 \sec 70^0\right)}{7\left(\cot 85^0 \cot 65^0 \tan 45^0 \tan 65^0 \tan 85^0\right)}$$

$$= \frac{3}{7} - \frac{4}{7}$$

$$= \boxed{-\frac{1}{7}}$$

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

$$= \frac{\sin 18^0}{\sin 72^0} + \sqrt{3}\left(\tan 10 \tan 30 \tan 40 \tan 50 \tan 80\right)$$

$$= \frac{\sin 18^0}{\sin 18^0} + \sqrt{3}\left(\cot 80 \tan 30 \cot 50 \tan 50 \tan 80\right)$$

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

$$= \boxed{2}$$

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

$$= \frac{\cos 58^0}{\sin 32^0} + \frac{\sin 22^0}{\cos 68^0} - \frac{\cos 38^0 \csc 52^0}{\tan 18^0 \tan 35^0 \tan 60^0 \tan 72^0 \tan 55^0}$$

$$= \frac{\cos 58^0}{\cos 58^0} + \frac{\sin 22^0}{\sin 22^0} - \frac{\cos 38^0 \sec 38^0}{\cot 72^0 \cot 55^0 \tan 60 \ \tan 72^0 \tan 55^0}$$

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

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

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