Solution

Q.1: Let $\alpha = 45°32'45''$ and $\beta = 23°44'25''$. Find $\alpha + \beta$, complement of α and suplement of β.

Sol: $\alpha + \beta = 45°32'45'' + 23°44'25'' = 69°17'10''$.

Complement of $\alpha = 90°00'00'' - 45°32'45'' = 44°27'15''$

Suplement of $\beta = 180°00'00'' - 23°44'25'' = 156°15'35''$

Q.2: Convert $\alpha + \beta$ to decimal degree.

Sol: $\alpha + \beta = 69°17'10'' = \left(69 + \dfrac{17}{60} + \dfrac{10}{3600}\right) = 69.286°$.

Q.3: A wheel is rotating at 35 revolutions per minute. Find the angular speed in radiuns per second.

Sol: $w = 35 \; rev/\min = \dfrac{(35)\,(2\pi)}{60} rad/\sec = \dfrac{70\pi}{60} rad/\sec = \dfrac{7\pi}{6} rad/\sec$.

Q.4: Find the value of $\sin 135° \cos 150° + \sec \frac{5\pi}{6} \csc \frac{7\pi}{4}$.

Sol: $\sin 135° \cos 150° + \sec \frac{5\pi}{6} \csc \frac{7\pi}{4} = \sin 45° \left(-\cos 30°\right) + \left(-\sec \frac{\pi}{6}\right)\left(-\csc \frac{\pi}{4}\right)$

$$= \frac{\sqrt{2}}{2}\frac{-\sqrt{3}}{2} + \frac{-2}{\sqrt{3}}\left(-\sqrt{2}\right) = \frac{-\sqrt{6}}{4} + \frac{2\sqrt{6}}{3}.$$

Q.5: If $(3, -4)$ is a point on the terminal side of θ, find $\sin\theta, \; \cos\theta, \; \tan\theta$.

Sol: $x = 3, \; y = -4,$ and $r = \sqrt{9 + 16} = 5$.

$\sin\theta = -\dfrac{4}{5}, \; \cos\theta = \dfrac{3}{5}, \; \tan\theta = -\dfrac{4}{3}$.

Q.6: If $\cos\theta = -\dfrac{3}{5}$ and $\sin\theta > 0$, find $\tan\theta$.

Sol: cosine is negative and sine is positive, so quadrant is II

$$\sin\theta = \sqrt{1 - \cos^2\theta} = \sqrt{1 - \frac{9}{25}} = \frac{4}{5}$$

$$\tan\theta = \frac{\frac{4}{5}}{-\frac{3}{5}} = -\frac{4}{3}.$$