$$F_x(t) = m\,a_x(t) = 0.25\,Kg\left[-\left(2.00\,\frac{m}{s^2}\right)\cos\left[\left(2.0\,\frac{rad}{s}\right)t + \frac{\pi}{6}\right]\right]$$

$$= -0.50N\,\cos\left[\left(2.0\,\frac{rad}{s}\right)t + \frac{\pi}{6}\right].$$

To determine the force as a function of X we can use

$$F_x(x) = -K(X - X_{eq})$$

but we would need to calculate the value of K.

However, notice that this problem allows us to calculate $X = X(t)$, which can be rearranged to give

$$\cos\left[\left(2.0\,\frac{rad}{s}\right)t + \frac{\pi}{6}\right] = \frac{X - 0.25m}{0.50m} \quad \Rightarrow.$$

Thus

$$F_x(x) = (-0.50N)\left(\frac{X - 0.25m}{0.50m}\right) = -\left(1.00\,\frac{N}{m}\right)(X - 0.25m).$$

We see that $K = 1.00\,\frac{N}{m}$ in this situation.