Question #77660, Physics / Other

A wheel of 40cm radius rotates on a stationary rim. It is uniformly speeded up from a rest to a speed of 900 rpm. In a time of 20 sec.

A. Find the constant acceleration.

B. The tangential accelerating of the rim.

Solution

a.

$$a_N = r\omega^2 = 0.4\left(900\frac{2\pi}{60}\right)^2 = 3553\frac{m}{s^2}$$

b.

$$a_\tau = \frac{r\omega}{t} = \frac{0.4\left(900\frac{2\pi}{60}\right)}{20} = 1.9\frac{m}{s^2}$$

2. A pulley of 5cm radius of a motor is turning at 30 revolution per second. And slow down uniformly to 20 revolution per second in 2 second. Calculate

A. The angular acceleration of the motor

B. The number of revolution it made this time

C. The length of belt it winds in this time

Solution

a.

$$\alpha = \frac{\Delta\omega}{t} = \frac{\left(20\frac{2\pi}{1}\right) - \left(30\frac{2\pi}{1}\right)}{2} = -10\pi\frac{rad}{s^2} = -31\frac{rad}{s^2}$$

b.

$$2\alpha\theta = \omega_2^2 - \omega_1^2$$

$$2\alpha(2\pi)n = \omega_2^2 - \omega_1^2$$

$$n = \frac{1}{4\pi(-10\pi)}\left(\left(20\frac{2\pi}{1}\right)^2 - \left(30\frac{2\pi}{1}\right)^2\right) = 50\,rev.$$

c.

$$l = 2\pi rn = 2\pi(0.05)(50) = 16\,m$$

Answer provided by https://www.AssignmentExpert.com