Answer on Question #41003, Physics, Mechanics

Ten seconds after an electric fan is turned on, it was fund to have an angular speed of 300 rev/min, Its average angular acceleration is:

1800 rev/sec²

3.14 rad/sec²

30 rad/sec²

30 rev/sec²

50 rev/min²

Solution:

Rotation is described in terms of angular displacement , time , angular velocity, and angular acceleration . Angular velocity is the rate of change of angular displacement and angular acceleration is the rate of change of angular velocity.

Average angular acceleration:

$$\overline{\alpha} = \frac{\Delta\omega}{\Delta t}$$

where $\Delta\omega$ is the rate of change of angular velocity in time Δt.

$$\Delta\omega = \omega_f - \omega_i$$

Given:

$\omega_i = 0$

$\omega_f = 300 \text{ rev/ min} = \frac{300}{60} \text{ rev/s} = 5 \text{ rev/s} = 5 \cdot 2\pi \text{ rad/s}$

$\Delta t = 10 \, s,$

$\overline{\alpha} =?$

$$\overline{\alpha} = \frac{\omega_f - \omega_i}{\Delta t} = \frac{5 \cdot 2 \cdot 3.14}{10} = 3.14 \text{ rad/s}^2$$

Answer. 3.14 rad/sec²