Answer on Question #65704, Physics / Mechanics | Relativity |

A solid cylinder of mass 3.0 kg and radius 1.0 m is rotating about its axis with a speed of 40 rad/sec. Calculate the torque which must be applied to bring it to rest in 10 sec. What would be the power required?

Solution

m = 3 kg

R = 1 m

ω_1 = 40 rad/sec

ω_2 = 0

t = 10 sec

τ – ?, F – ?

$$\tau = I\frac{d\omega}{dt} = I\frac{\omega_1 - \omega_2}{t}, \quad I = \frac{mR^2}{2}$$

$$\tau = \frac{3 \cdot 1}{2} \cdot \frac{40}{10} = 6(\mathrm{N \cdot m})$$

F = τ/R = 6/1 = 6 (N)

Answer: 6 N m, 6 N