



Find solutions for your homework

Search

ON

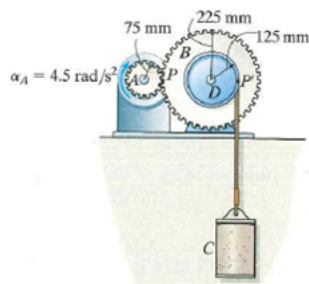
[home](#) / [study](#) / [engineering](#) / [mechanical engineering](#) / [classical mechanics](#) / [classical mechanics solutions manuals](#) / [engineering mechanics](#) / [14th edition](#) / [chapter 16](#) / [problem 6fp](#)

Engineering Mechanics | (14th Edition)

[See this solution in the app](#)

Problem

For a short period of time, the motor turns gear A with a constant angular acceleration of $\alpha_A = 4.5 \text{ rad/s}^2$, starting from rest. Determine the velocity of the cylinder and the distance it travels in three seconds. The cord is wrapped around pulley D which is rigidly attached to gear B .



Prob. F16-6

Step-by-step solution

Step 1 of 5

Given:

Constant angular acceleration of the gear A is $\alpha_A = 4.5 \text{ rad/s}^2$

[Comment](#)

Step 2 of 5

Initially gear is at rest.

For gears A and B , we have

$$r_A \alpha_A = r_B \alpha_B$$

Accordingly,

$$0.075 \times 4.5 = 0.225 \times \alpha_B$$

$$0.225 \alpha_B = 0.3375$$

$$\alpha_B = 1.5 \text{ rad/s}^2$$

[Comment](#)

Step 3 of 5

Angular velocity of gear B is expressed as

Post a question

Answers from our experts for your tough homework questions

Enter question

Continue to post

18 questions remaining



Snap a photo from your phone to post a question
We'll send you a one-time download link

888-888-8888

Text me

By providing your phone number, you agree to receive a one-time automated text message with a link to the app. Standard messaging rates may apply.

My Textbook Solutions



Engineering Mechanics
14th Edition



Fundamentals of...
4th Edition



Fundamentals of...
4th Edition

[View all solutions](#)

 $\omega_B =$

Chapter 16, Problem 6FP

1 Bookmark

Show all steps: ON

 $\omega_B =$

We also have angular displacement expressed as

$$\theta_B = (\theta)_0 + (\omega_B)_0 t + \frac{1}{2} \alpha_B t^2$$

[Comment](#)
Step 4 of 5

By substituting the values of the parameters into the above relation, we have

$$\theta_B = 0 + (0 \times 3) + \left(\frac{1}{2} \times 1.5 \times 3^2 \right)$$

$$\theta_B = 6.75 \text{ rad}$$

Velocity of the cylinder is expressed as

$$v_C = r_D \omega_B$$

Accordingly, we have

$$v_C = 0.125 \times 4.5$$

$$v_C = 0.5625 \text{ m/s}$$

Velocity of the cylinder is

[Comment](#)
Step 5 of 5

Distance travelled by the cylinder is expressed as

$$s_C = r_D \theta_B$$

Accordingly, we have

$$s_C = 0.125 \times 6.75$$

$$s_C = 0.844 \text{ m}$$

Distance travelled by the cylinder is

[Comment](#)

Was this solution helpful?

Recommended solutions for you in Chapter 16

<p>the motor tu with a const acceleration rad/s², starting from rest...</p> <p>See solution</p>	<p>Chapter 16, Problem 6FP</p>	<p>1 Bookmark</p>	<p>Show all steps: <input type="checkbox"/> ON</p>	
--	--------------------------------	-------------------	--	--

[See more problems in subjects you study](#)

COMPANY 

LEGAL & POLICIES 

CHEGG PRODUCTS AND SERVICES 

CHEGG NETWORK 

CUSTOMER SERVICE 



© 2003-2021 Chegg Inc. All rights reserved.