

Re: An IITJEE problem

Source: <http://sci.tech--archive.net/Archive/sci.physics.relativity/2006-04/msg02384.html>

- *From:* mL <mL.beyond@xxxxxxxxxxxxxx>
 - *Date:* Fri, 28 Apr 2006 18:21:51 GMT
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Hi David,

Dear mL:

"mL" <mL.beyond@xxxxxxxxxxxxxx> wrote in message
[news:Uv14g.54699\\$d5.209196@xxxxxxxxxxxxxx](mailto:news:Uv14g.54699$d5.209196@xxxxxxxxxxxxxx)

N:dlzc D:aol T:com (dlzc):

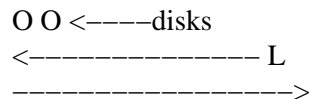
Dear Nishu:

"Nishu" <amitk_dni@xxxxxxxxxxxxxx> wrote in message
news:1146152710.843745.302370@xxxxxxxxxxxxxx

I have a SHM problem.

"Simple Harmonic Motion"

A rod of length L is placed on two circular
discs.
The coefficient of friction between rod and
discs
is k . The rod is displaced by a small distance
 x .
Determine the time period of the
oscillations.



The answer is $t = 2\pi\sqrt{L/2kg}$ [g - acc due to
gravity)
But I want the solution.

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The problem setup is lacking much.

Try this figure:



I assume the disks are acting like wheels, so there would be no SHM.

If the wheels, A and B, are *counter rotating* (driven at the same angular speed) the rod will move (slide) to and fro.

Thanks mL.. Counter rotating with A rotating clockwise, and B rotating counterclockwise. L is given as the length of the rod. The distance between A and B needs to be greater than x (for any x) and less than L.

To satisfy the given answer, L has to be the distance between the wheel axes (as shown in my figure).

Your formula gets trashed if you do not use ASCII.
Is this $t = 2 \cdot \pi \cdot \sqrt{L / (2 \cdot k \cdot g)}$?

Seems to be correct.

The period of oscillation is a function of wheel speed. So any result will have to be expressed in terms of that. From the result given above, it looks like it might be 1 revolution per second (2 . pi radians).

As it turns out, the period doesn't depend on the angular wheel speed.

[...]

Mel

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