

NCERT/CBSE PHYSICS CLASS 11 textbook

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Answers to NCERT/CBSE PHYSICS Class 11(Class XI)textbook Exercise and Additional exercise

CHAPTER SEVEN

SYSTEM OF PARTICLES AND ROTATIONAL MOTION

EXERCISES

(For simplicity in numerical calculations, take $g = 10 \text{ m s}^{-2}$)

7.14 A rope of negligible mass is wound round a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30 N ? What is the linear acceleration of the rope ? Assume that there is no slipping

7.14

Solution:

Mass of cylinder, $M=3 \text{ kg}$

Radius of cylinder , $r=40 \text{ cm}$

Force applied, $F=30 \text{ N}$

Torque, $\tau=FR=30 \times 0.4=12 \text{ Nm}$

Angular acceleration, $\alpha = \frac{\tau}{I} = \frac{12}{3 \times 0.4^2} = 25 \text{ rads}^{-2}$

Linear acceleration, $a = \alpha R = 0.4 \times 25 = 10 \text{ ms}^{-2}$

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