

Kinematics :

$$v_B = r\omega \quad \text{because there is no slip}$$

$$\Rightarrow \omega_1 = \frac{2}{0.2} = 10 \text{ rad/s}$$

$$\Rightarrow \omega_2 = 5 v_{B2}$$

Substitute in...

$$(0.40)(10) + (0.6)T = (2.0)v_{B2} \quad \textcircled{A}$$

$$-6(2) + 3T - 176.58 = -6 v_{B2}$$

TIDYING UP \Rightarrow 2 Simultaneous Eqs.

$$4 + 0.6T = 2.0 v_{B2}$$

$$-182.78 + 3T = -6 v_{B2}$$

Solve for v_{B2}

$$\Rightarrow \underline{v_{B2} \approx 13.0 \text{ m/s}}$$

SOLUTION II

WE CAN ALSO CONSIDER BLOCK, CORD

AND DISK ALL AT ONCE ...