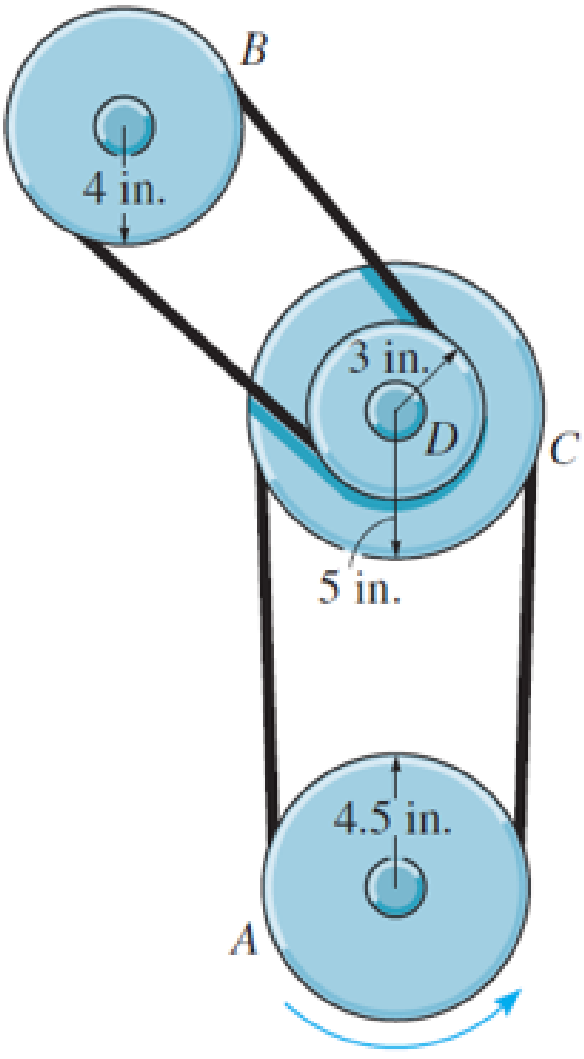
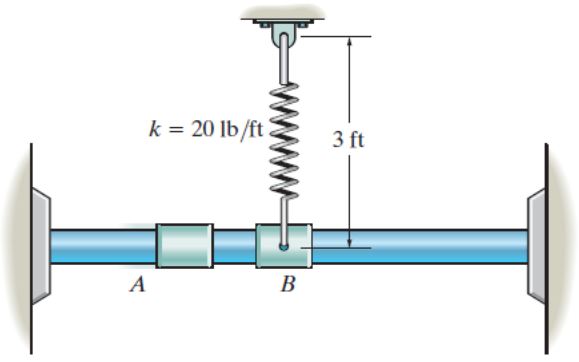
1) A mill in a textile plant uses the belt-and-pulley arrangement shown to transmit power. When $t = 0$ an electric motor is turning pulley A with an angular velocity of $\omega_A = 5\ rad/s$. If this pulley is subjected to an acceleration $\alpha_A = 0.25\theta^3 + 0.5\ rad/s^2$, determine the angular velocity of pulley B after B turns 6 revolutions. The hub at D is rigidly connected to pulley C and turns with it.



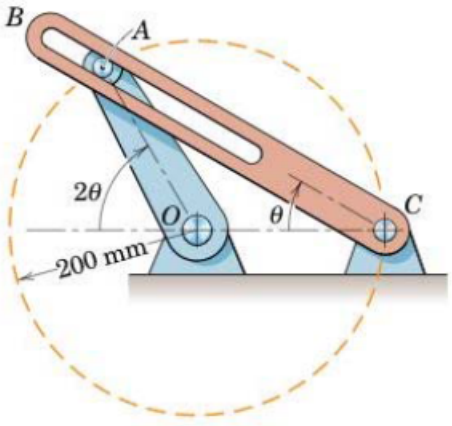
30 marks

2) The 10 lb collar B is at rest, and when it is in the position shown the spring is unstretched. Another 1 lb collar A is traveling at an initial speed v_{A1} when it strikes collar B, causing B to slide 4 ft on the smooth rod before momentarily stopping. Determine the velocity of A before and after impact. The coefficient of restitution between A and B is $e = 0.5$.
Clearly label your coordinate system(s).



30 marks

3) The crank OA revolves clockwise with a constant angular velocity of 10 rad/s within a limited arc of its motion. For the position $\theta = 30^o$ determine the angular velocity and angular acceleration of the slotted link CB. Clearly label your coordinate system(s).



40 marks