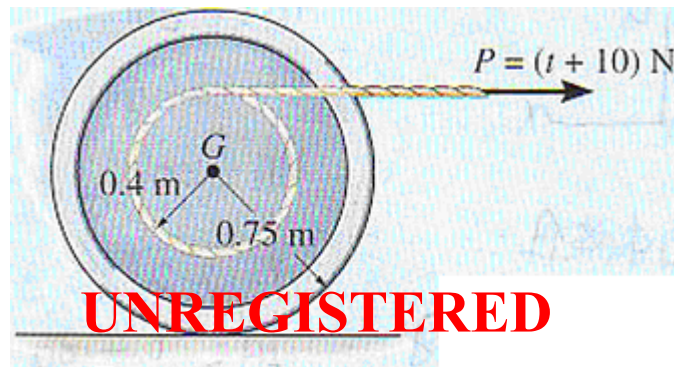


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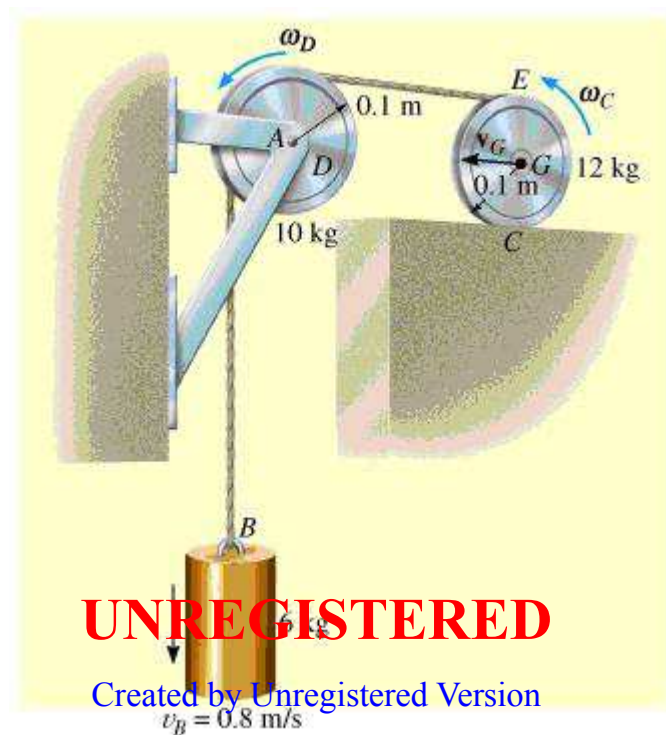
1. The 100 kg spool shown in Fig. 1 has a radius of gyration $k_G = 0.35$ m. A cable is wrapped around the central hub of the spool, and a horizontal force having a variable magnitude of $P = (t + 10)$ N is applied, where t is in seconds. If the spool is initially at rest, determine its angular velocity in 5 s. Assume that the spool rolls without slipping at A. (25%)



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Fig. 1

2. The system of three elements shown in Fig. 2 consists of a 6-kg block B, a 10-kg disk D, and a 12-kg cylinder C. If no slipping occurs, determine the total kinetic energy of the system at the instant shown. (25%)



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Fig. 2

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3. The uniform slender pole shown in Fig. 3 has a mass of 100 kg and a moment of inertia $I_G = 75 \text{ kg} \cdot \text{m}^2$. If the coefficients of static and kinetic friction between the end of the pole and the surface are $\mu_s = 0.3$ and $\mu_k = 0.25$, respectively, determine the pole's angular acceleration at the instant the 400-N horizontal force is applied. The pole is originally at rest. (25%)

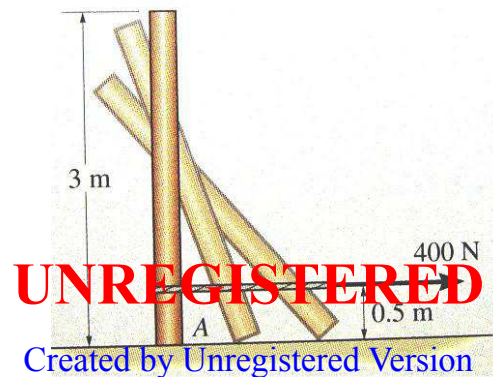


Fig. 3

4. The bar AB of the linkage shown in Fig 4 has a clockwise angular velocity of 30 rad/s when $\theta = 60^\circ$. Determine the angular velocities of member BC and the wheel at this instant. (25%)

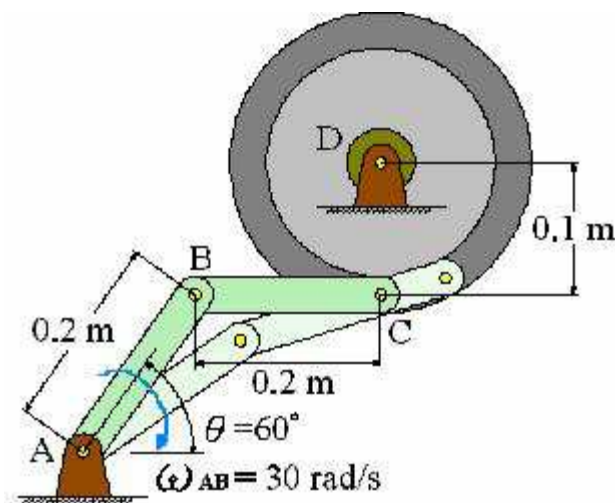


Fig. 4

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