

1. A curve beam member is loaded as shown in Figure 1. If the tension force in the cable AC is T , determine
 - (a) The internal forces just to the left of point B,
 - (b) The value of T for which the magnitude of bending moment at B is same as tension force in the cable.

(25%)

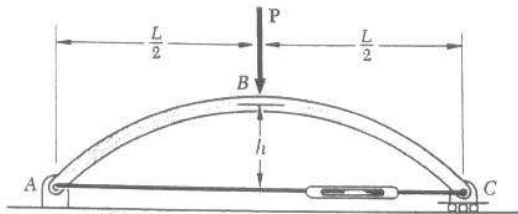


Figure 1

2. A 30-kg block is dropped from a height of 2 m onto the 10-kg pan of a spring scale. Assuming the impact to be perfectly plastic, determine the maximum deflection of the pan. The constant of the spring is $k = 20 \text{ kN/m}$.

(25%)

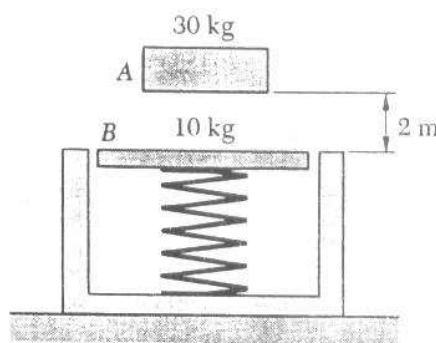


Figure 2

3. The block B of the “quick-return” mechanism is confined to move within the slot in member CD . If AB is rotating at a constant rate of $\omega_{AB} = 3 \text{ rad/s}$, determine the angular velocity and angular acceleration of member CD at the instant shown in the figure. (25%)

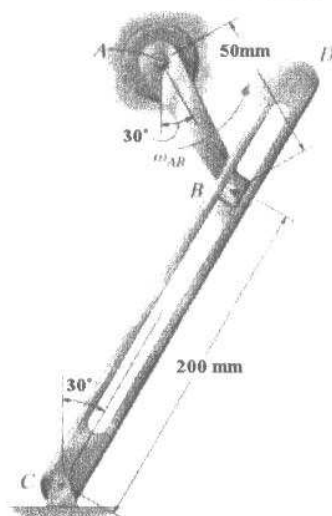


Figure 3

4. The lawn roller has a mass of 80 kg and a radius of gyration $k_G = 0.175 \text{ m}$. If it is pushed forward with a force of 200 N when the handle is at 45° , determine its angular acceleration. The coefficients of static and kinetic friction between the ground and the roller are $\mu_s = 0.12$ and $\mu_k = 0.1$, respectively. (25%)

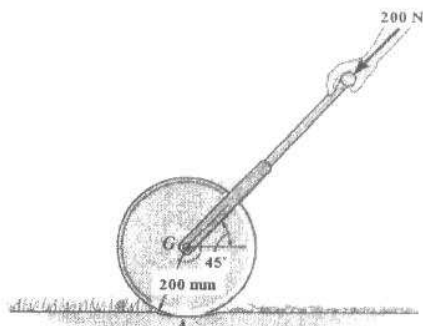


Figure 4