

Fig. 1

1. Determine the reactions at points A and C in Fig. 1. (20%)

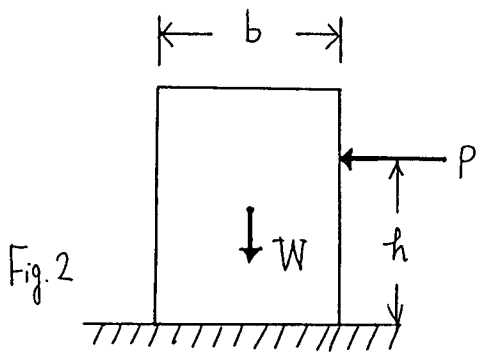


Fig. 2

2. A rectangular block of width b and weight W rests on a floor. (Fig. 2.). The coefficient of friction between the contact surfaces of the block and floor is μ . What is the highest midplane position of a horizontal force P that is capable of sliding the block without tipping it? (10%)

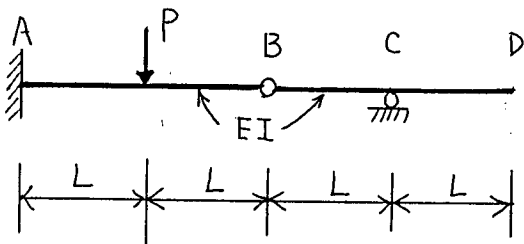


Fig. 3.

3. (a) Determine the deflection at point D. (Fig. 3)
 (b) plot the shear force diagram for the whole structure
 (c) plot the bending moment diagram for the whole structure. (20%)

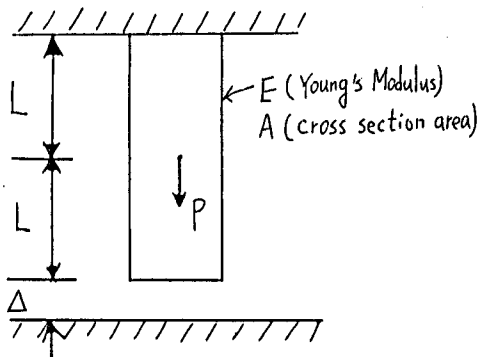


Fig. 4

4. A bar fixed at its upper end is loaded by a longitudinal force P . (Fig.4). There is a clearance Δ between the lower end of the bar, and the lower rigid support. When $P \gg EA\Delta/L$,
- determine the reaction at the lower support,
 - displacement δ at the point of application of the force P .
 - elastic energy U stored in the bar. Can you determine this by using $U = \frac{1}{2} P \delta$? Why? (20%)

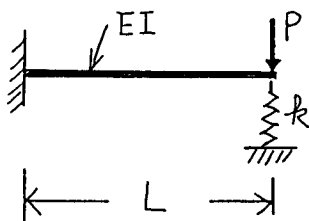


Fig. 5

5. Determine the force in the spring. (Fig.5.) (15%)

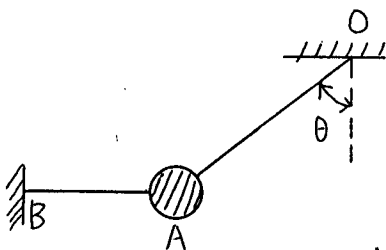


Fig. 6.

6. A simple pendulum is held in equilibrium by a horizontal wire AB , as shown in Fig. 6. Let T_1 be the tension in the wire OA when the pendulum is at rest. What is the tension T in the wire OA at the instant after the wire AB is cut? (15%)