CIV100F – MECHANICS ONLINE
Assignment No. 4
Due: As indicated in Quercus

Material Covered: Textbook – Chapter 5

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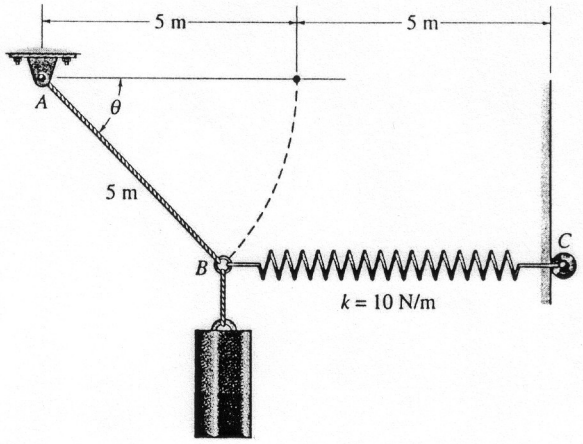
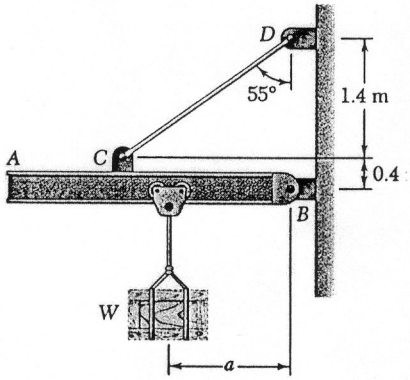
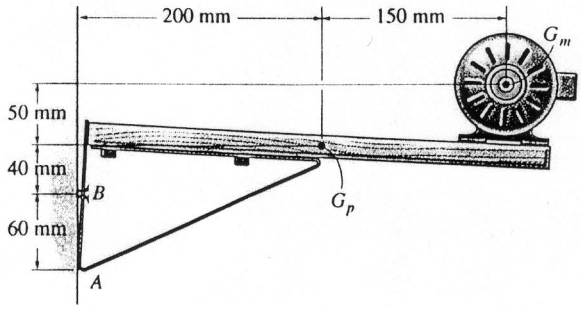
1. The cord AB has a length of 5 m and is attached to the end B of the spring having a stiffness $k = 10$ N/m. The other end of the spring is attached to a roller C so that the spring remains horizontal as it stretches. If a 10 N weight is suspended from B, determine the necessary un-stretched length of the spring, so that $\theta = 40°$ for equilibrium.



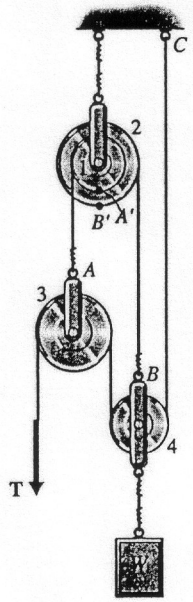
2. A 50 kg crate is attached to the trolley-beam system shown. Knowing that $a = 1.5$ m, determine the tension in cable CD and the reaction at B.



3. The shelf supports the electric motor which has a mass of 15 kg and mass centre at G_m. The platform upon which it rests has a mass of 4 kg and mass centre at G_p. Assuming that a single bolt B holds the shelf up and the bracket bears against the smooth wall at A, determine the reactions at A and B.



4. Pulleys 1 and 2 of the rope and pulley system shown are connected and rotate as a unit. The radii of pulleys 1 and 2 are 100 mm and 300 mm, respectively. Rope *A* is wrapped around pulley 1 and is fastened to pulley 1 at point *A'*. Rope *B* is wrapped around pulley 2 and is fastened to pulley 2 at point *B'*. The rope is continuous over pulleys 3 and 4. Determine the tension **T** in the rope, required to hold body *W* in equilibrium, if the mass of body *W* is 225 kg.



5. A former student of mechanics wishes to weigh himself but has access only to a scale A with capacity limited to 400 N and a small 80 N spring dynamometer B. With the rig shown, he discovers that when he exerts a pull on the rope so that B registers 76 N, the scale A reads 268 N. What is his mass m? Also, what range of weight can be measured with this system?