

King Fahd University of Petroleum & Minerals  
CIVIL ENGINEERING DEPARTMENT

CE 201 STATICS (Section 9)  
First Semester 1427-28 / 2006-07 (061)

H.W. # 12

**Due** on Sunday 17-12-1427 / 7-1-2007 (any time)

**Deadline** for submission: Monday 18-12-1427 / 8-1-2007 (**before you sit in class**)

- 1) The coefficients of friction between the block and the rail shown in Fig. P1 are  $\mu_s = 0.30$  and  $\mu_k = 0.25$ . Find the ***smallest force P*** required
- (a) to start the block up the rail,
  - (b) to keep it from moving down.
- [Secs. 8.1, 8.2] (20 pts.)
- 2) The coefficients of friction are  $\mu_s = 0.30$  and  $\mu_k = 0.25$  between all surfaces of contact shown in Fig. P2. Determine the ***smallest force P*** required to start block *D* moving if
- (a) block *C* is restrained by cable *AB* as shown,
  - (b) cable *AB* is removed.
- [Secs. 8.1, 8.2] (20 pts.)
- 3) Three 4-kg packages *A*, *B*, and *C* are placed on a conveyor belt which is at rest as shown in Fig. P3. Between the belt and both packages *A* and *C* the coefficients of friction are  $\mu_s = 0.30$  and  $\mu_k = 0.20$ ; between package *B* and the belt the coefficients are  $\mu_s = 0.10$  and  $\mu_k = 0.08$ . The packages are placed on the belt so that they are in contact with each other and at rest. Determine ***which, if any, of the packages will move and the friction force acting on each package.***
- [Secs. 8.1, 8.2] (20 pts.)
- 4) If block *A* shown in Fig. P4 has a mass of 1.5 kg, determine the ***largest mass of block B*** without causing motion of the system. The coefficient of static friction between the blocks and inclined planes is  $\mu_s = 0.2$ .
- [Secs. 8.1, 8.2] (20 pts.)
- 5) A 20-lb homogeneous box has tipped and is resting against a 40-lb homogeneous box as shown in Fig. P5. The coefficient of friction between box *A* and the floor is 0.7; between box *B* and the floor, 0.4. Treat the contact surface between the two boxes as smooth and determine ***whether the boxes are in equilibrium.***
- [Secs. 8.1, 8.2] (20 pts.)

Fig. P1

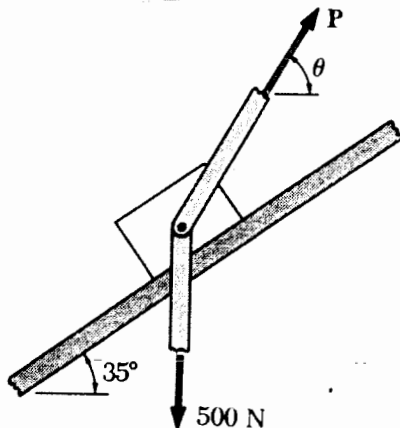
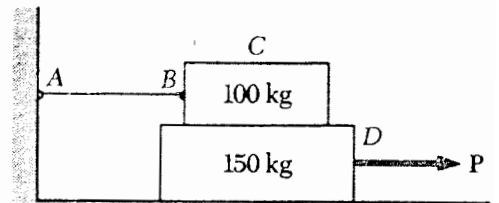


Fig. P2



**Do your work yourself!! Remember that the homework carries 20% of the course grade; in addition, solving it is the best way to understand the subject. Of course, you can seek my help anytime in the homework as well as in anything else.**

**As an engineer, review the guidelines for submitting homework assignments given to you in class BEFORE you start solving and writing the homework. DO NOT SUBMIT THE HOMEWORK IF YOU DO NOT FOLLOW THESE GUIDELINES. Cheating, copying, etc. is .....!!!!!!**

Fig. P3

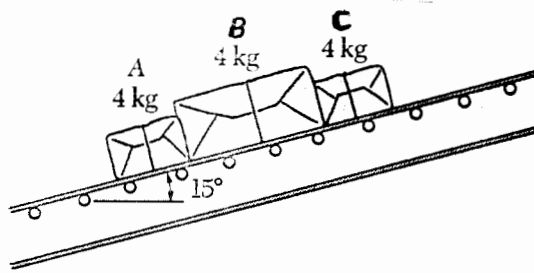


Fig. P4

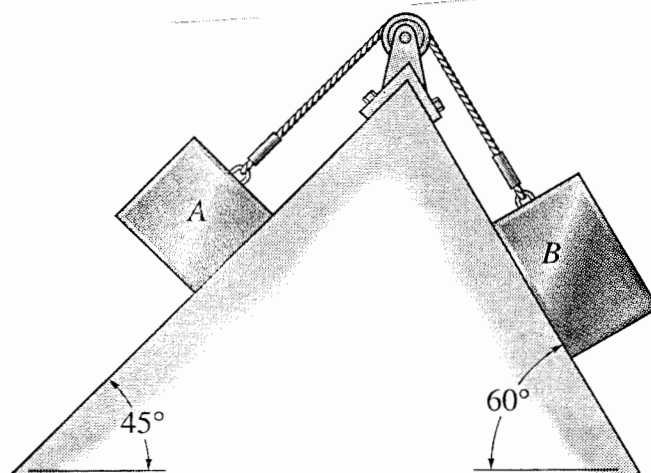


Fig. P5

