

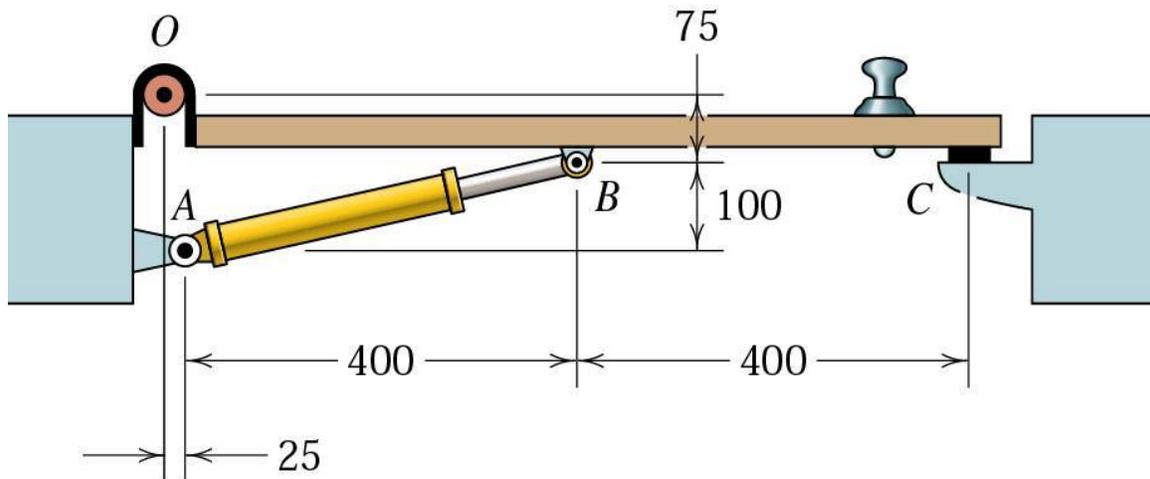
ENSC 230- Mechanics-Based Modeling, Design and Simulation - I

Homework Set 2

Static Analysis

(15)-Number 1

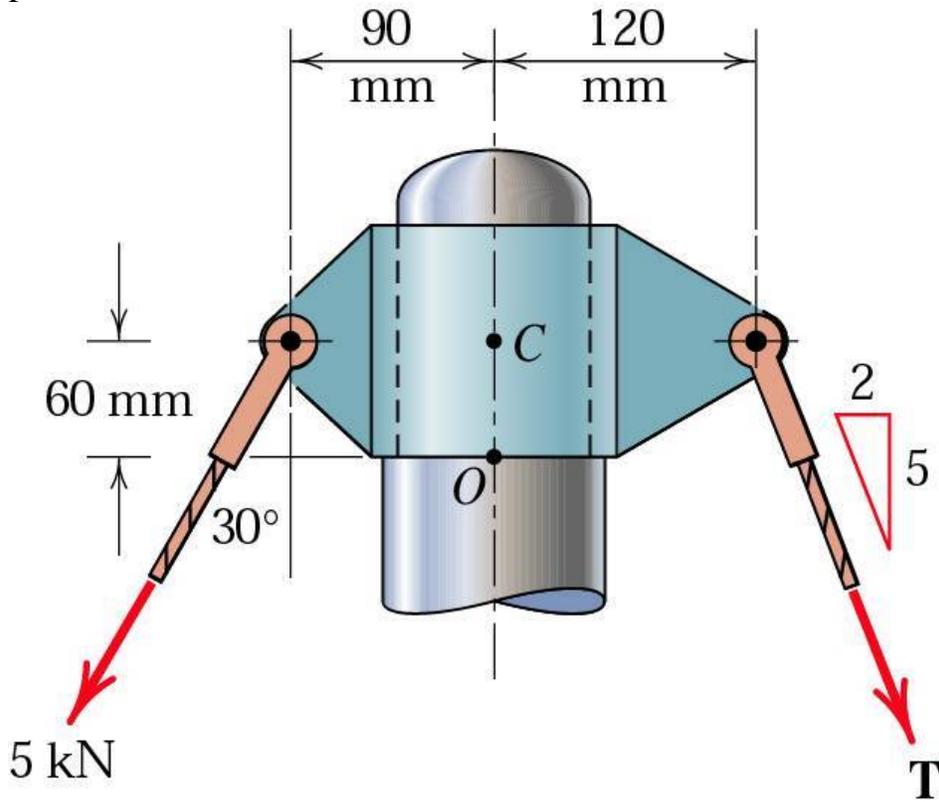
The force exerted by the plunger of cylinder AB on the door is 40 N directed along the line AB, and this force tends to keep the door closed. Compute the moment of this force about the hinge O. What force F_c normal to the plane of the door must the door stop at C exert on the door so that the combined moment about O of the two forces is zero?



Dimensions in millimeters

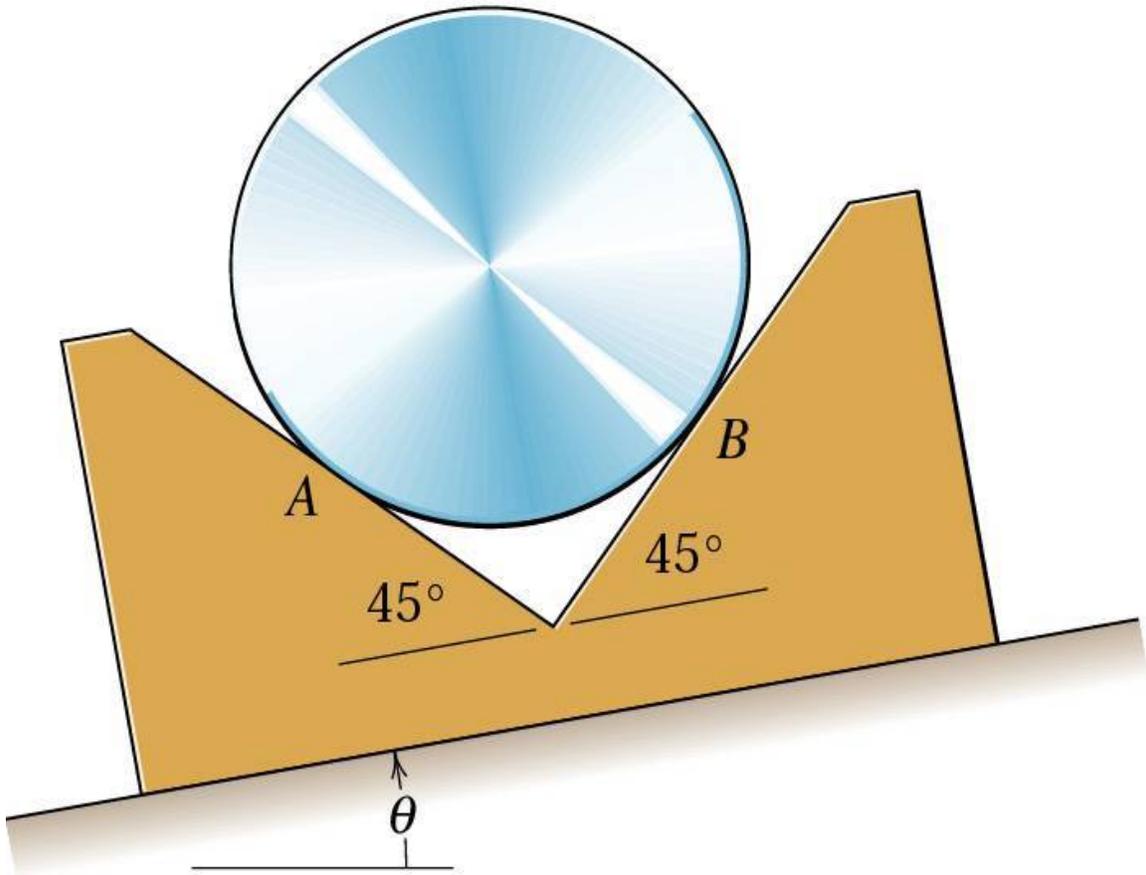
(10)-Number 2

The masthead fitting supports the two forces shown. Determine the magnitude of T which will cause no bending of the mast (zero moment) at point O .



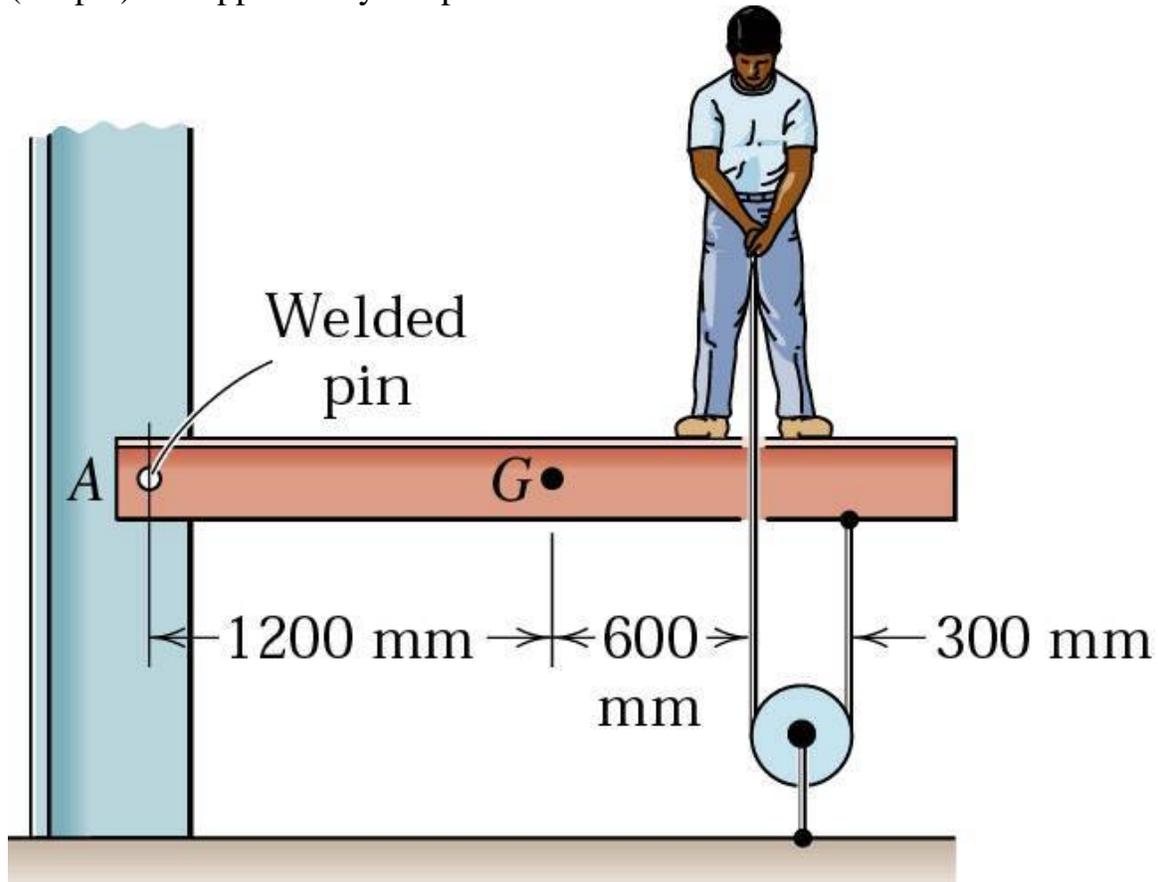
(20)-Number 3

Find the angle of tilt θ with the horizontal so that the contact force at B will be one-half that at A for the smooth cylinder.



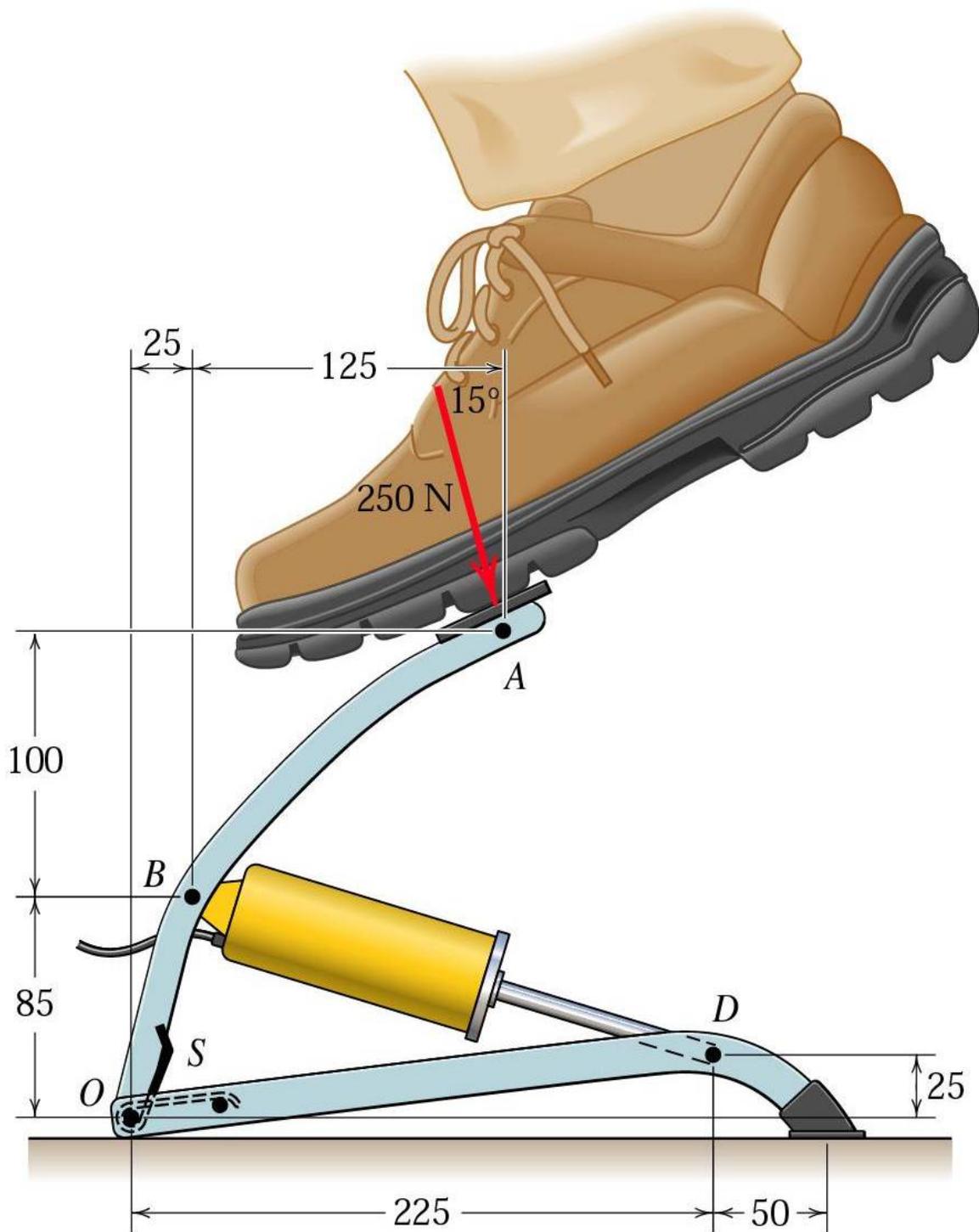
(20)-Number 4

The pin A, which connects the 200-kg steel beam with center of gravity at G to the vertical column, is welded both to the beam and to the column. To test the weld, the 80-kg man loads the beam by exerting a 300-N force on the rope with passes through a hole in the beam as shown. Calculate the torque (couple) M supported by the pin.



(20)-Number 5

A 250-N force is applied to the foot-operated air pump. The return spring S exerts a 3-N.m moment on member OBA for this position. Determine the corresponding compression force C in the cylinder BD. If the diameter of the piston in the cylinder is 45 mm, estimate the air pressure generated for these conditions. State any assumptions.



Dimensions in millimeters

(20)-Number 6

The 300-lb crate with mass center at G is supported on the horizontal surfaces by a skid at A and a roller at B . If a force P of 60 lb is required to initiate motion of the crate, determine the coefficient of static friction at A .

