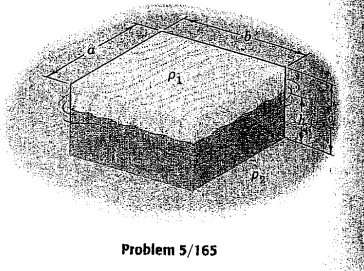


5/165 A rectangular block of density ρ_1 floats in a liquid of density ρ_2 . Determine the ratio $r = h/c$, where h is the submerged depth of block. Evaluate r for an oak block floating in fresh water and for steel floating in mercury.

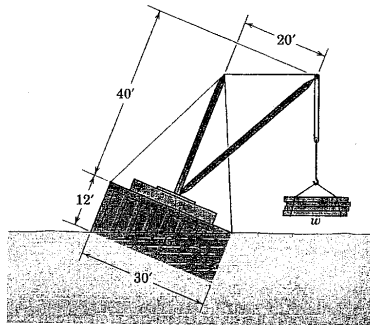
Ans. $r = \frac{\rho_1}{\rho_2}$, $r = 0.8, 0.577$



Problem 5/165

5/181 The barge crane of rectangular proportions has a 12-ft by 30-ft cross section over its entire length of 80 ft. If the maximum permissible submergence and list in sea water are represented by the position shown, determine the corresponding maximum safe load w which the barge can handle at the 20-ft extended position of the boom. Also find the total displacement W in long tons of the unloaded barge (1 long ton equals 2240 lb). The distribution of machinery and ballast places the center of gravity G of the barge, minus the load w , at the center of the hull.

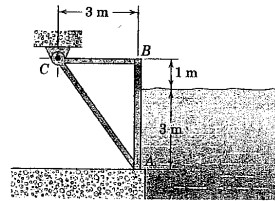
Ans. $w = 100,800$ lb, $W = 366$ long tons



Problem 5/181

5/211 The figure shows the cross section of a rectangular gate 4 m high and 6 m long (perpendicular to the paper) which blocks a fresh-water channel. The gate has a mass of 8.5 Mg and is hinged about a horizontal axis through C . Compute the vertical force P exerted by the foundation on the lower edge A of the gate. Neglect the mass of the frame to which the gate is attached.

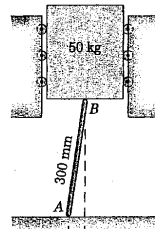
Ans. $P = 348$ kN



Problem 5/211

6/7 The light bar is used to support the 50-kg block in its vertical guides. If the coefficient of static friction is 0.30 at the upper end of the bar and 0.40 at the lower end of the bar, find the friction force acting at each end for $x = 75$ mm. Also find the maximum value of x for which the bar will not slip.

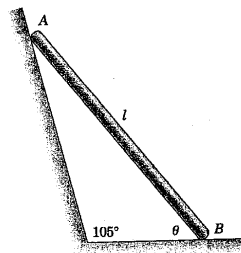
Ans. $F_A = F_B = 126.6$ N, $x_{max} = 86.2$ mm



Problem 6/7

6/13 The uniform pole of length l and mass m is placed against the supporting surfaces shown. If the coefficient of static friction is $\mu_s = 0.25$ at both A and B , determine the maximum angle θ at which the pole can be placed before it begins to slip.

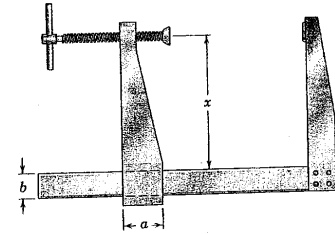
Ans. $\theta = 59.9^\circ$



Problem 6/13

6/29 The movable left-hand jaw of the C-clamp can be slid along the frame to increase the capacity of the clamp. To prevent slipping of the jaw on the frame when the clamp is under load, the dimension x must exceed a certain minimum value. For given values of a and b and a static friction coefficient μ_s , specify this design minimum value of x to prevent slipping of the jaw.

Ans. $x = \frac{a - b\mu_s}{2\mu_s}$



Problem 6/29