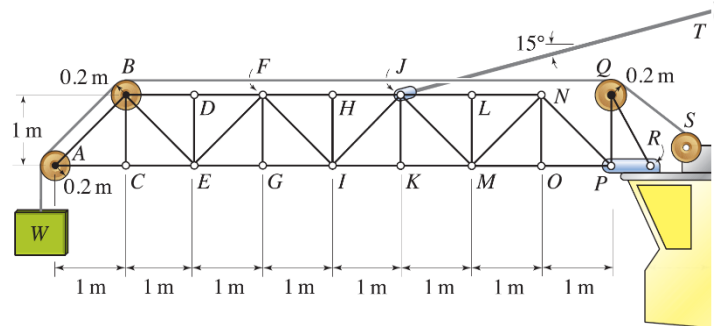


Statics: Final Exam

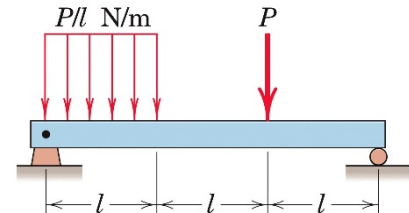
2016. 12. 20. 11:00~13:00, Closed Book

Instructor: Seungtae CHOI

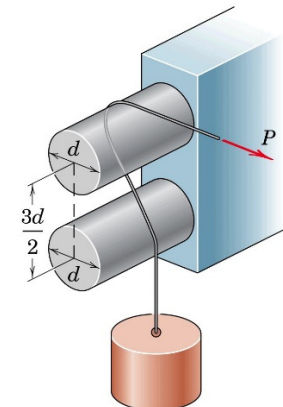
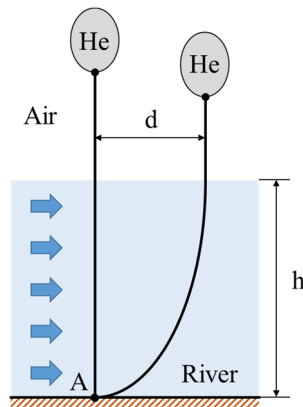
1. (20 points) The boom of a tower crane is shown. The pulleys at A , B , and Q are frictionless.
 - (a) Find out all the zero-force members in the boom.
 - (b) Express the force supported by the cable JT in terms of W .
 - (c) Express the force supported by the member IK in terms of W .



2. Draw the shear force and bending moment diagrams for the loaded beam and find the maximum magnitude, $M_{\max}$, of the bending moment.



3. A helium-filled balloon, receiving the buoyancy, B , in the air, is fixed with a weightless cable to the point A on the bottom of the river. The left-to-right flow in the river causes a uniform drag force per cross-river meter, w , on the cable. Express the distance, d , in terms of h , w , and B . Neglect the weight of the balloon.
4. (a) Calculate the horizontal force, P_U , required to raise the mass, m .
 (b) Calculate the horizontal force, P_D , required to lower the mass, m .
 The coefficient of friction between the rope and the fixed bars is μ .



5. (a) Calculate the height, h , of the centroid of the shaded area.
 (b) Calculate the moments of inertia about the x_0 and y_0 axes located at its centroid, C .
 (c) Calculate the polar radius of gyration of the shaded area about its centroid, C .

