Homework 2 - Questions 2.6, 2.18, 2.34, 2.38, 2.54 and 2.80

1) Pick a piece of artwork that you think effectively represents fluid mechanics and explain why.

2) Q 2.6
An unknown immiscible liquid seeps into the bottom of an open oil tank. Some instruments indicate that the depth of the unknown liquid is 1.5 m and the depth of the oil (specific weight=8.5 kN/m^3) floating on top is 5m. A pressure gauge connected to the bottom of the tank reads 65kPA. What is the specific gravity of the unknown liquid?

3) Q 2.18
A mercury manometer is connected to a large reservoir of water as shown in the figure. Determine the ratio h_w/h_m indicated.

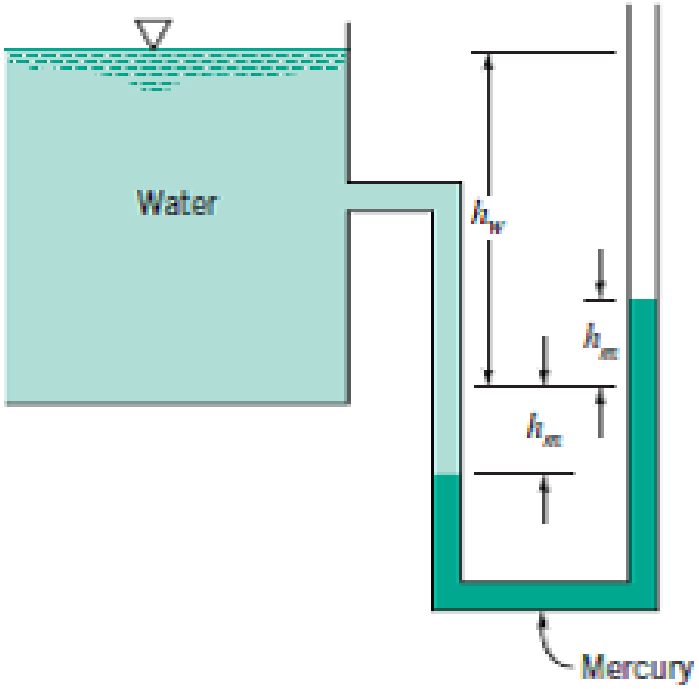

FIGURE P2.18

4) Q 2.34

A piston having cross section area of 0.09 m^2 is located in a cylinder containing water as shown in fig 2.34. An open U-tube manometer is connected to the cylinder as shown. For h_1=60mm and h=100mm, what is the value of the applied force P, acting on the piston. Weight of the piston is negligible.

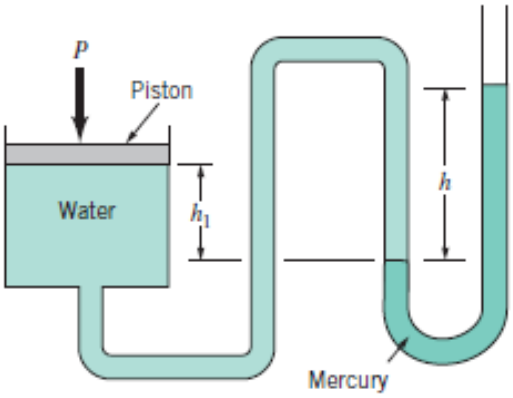

FIGURE P2.34

5) Q. 2.38

A rectangular gate of width 4 ft is located in the sloping side of a tank as shown in fig 2.38. The gate is hinged along its top edge and is held in position by the force P. Friction at the hinge and weight of the gate can be neglected. Determine required value of P.

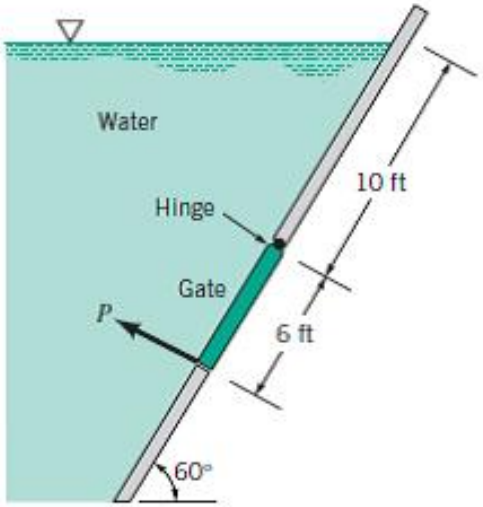

FIGURE P2.38

6) Q 2.54

A rectangular gate that is 2m wide is located in the vertical wall of a tank containing water as in figure 2.54. It is desired to have the gate open automatically when the depth of water above the top for the gate reaches 10m

(a) At what distance d should the frictionless horizontal shaft be located?
(b) What is the magnitude of the force when the gate opens?

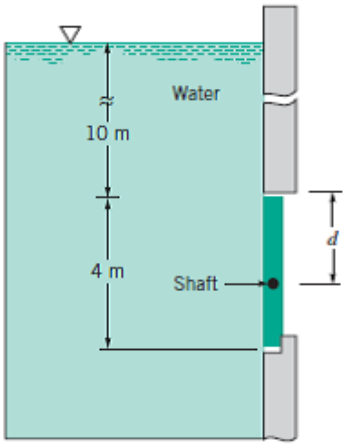

FIGURE P2.54

(c)

7) Q2.80

A 1m diameter cylindrical mass, M, is connected to a 2m wide rectangular gate as shown in fig 2.80. The gate is to open when the water level h drops below 2.5m. Determine the required value for M. Neglect friction at the gate hinge and the pulley

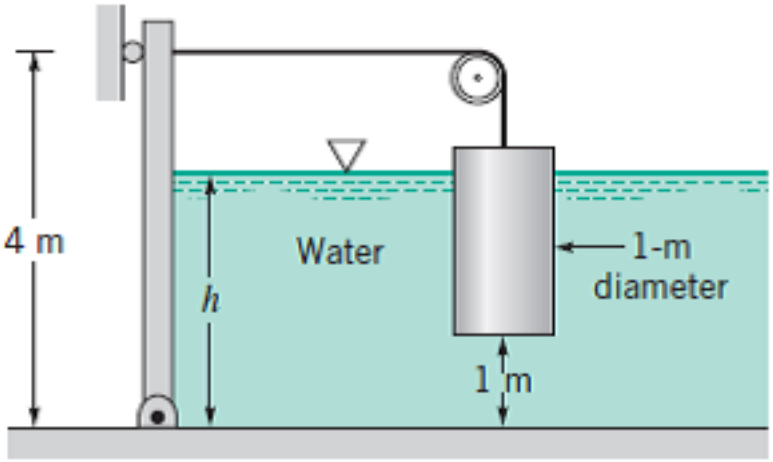

FIGURE P2.80