Sheet 6

Flow in Pipes

1. Water flow in constant diameter pipe with the following conditions measured:
At section (a): p_a = 223.39 KPa and z_a = 17.3 m.
At section (b): p_b = 204.774 KPa and z_a = 20.8 m.
Is the flow from (a) to (b) or from (b) to (a)? Explain.

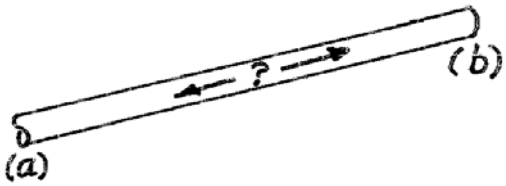

Figure 1

2. Repeat Problem (1) if the specific gravity of the fluid is 0.5.

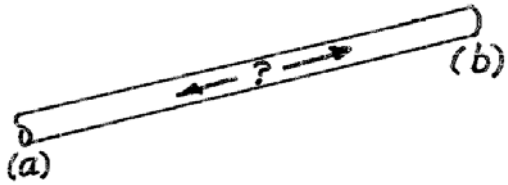

Figure 2

3. Oil (specific weight = 8900 N/m3, viscosity = 0.1 N.s/m2) flows through a horizontal 23 mm diameter tube as shown in figure 3. A differential tube manometer is used to measure the pressure drop along the tube. Determine the range of values for h for laminar flow.

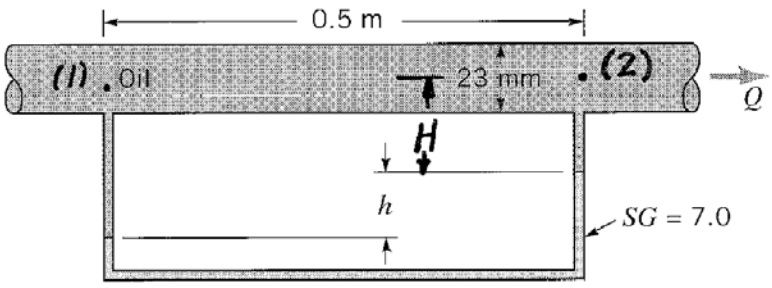

Figure 3

4. During a heavy rainstorm, water from a parking lot completely fills an 45.72 cm diameter, smooth, concrete storm sewer. If the flow rate is 0.2831 m^3/s, determine the pressure drop in a 30.48 m horizontal section of the pipe. Repeat the problem if there is a 60.96 cm change in elevation of the pipe per 30.48 m of its length.

5. Water flows at a rate of 0.01416 m^3/s from tank A to tank Through a horizontal 7.62 cm diameter cast iron pipe of length 60.96 m. if minor losses are neglected, determine the difference in elevation of the free surfaces of the tanks.

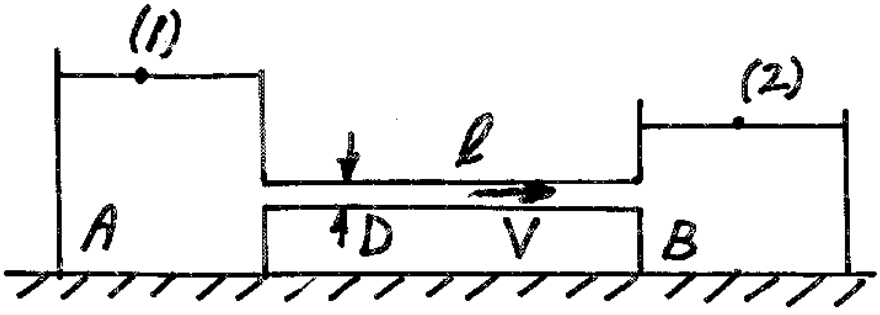

Figure 4

6. The pump shown in figure 5 adds 25 kW to the water and causes a flowrate of 0.04 m^3/ s. Determine the flowrate expected if the pump is removed from the system. Assume f = 0.016 for both cases and neglect minor losses.

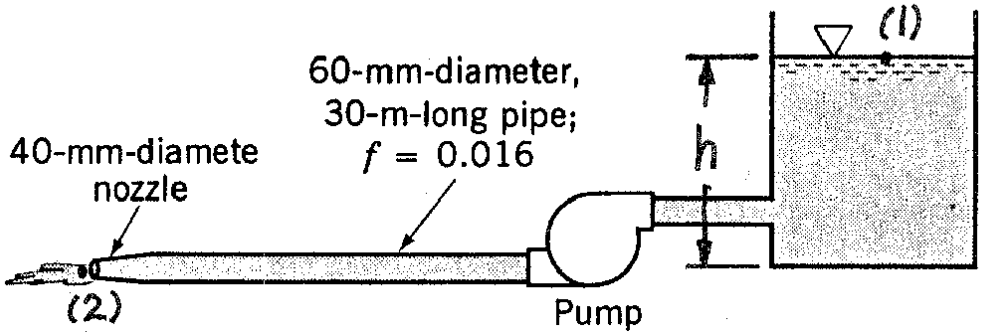

Figure 5