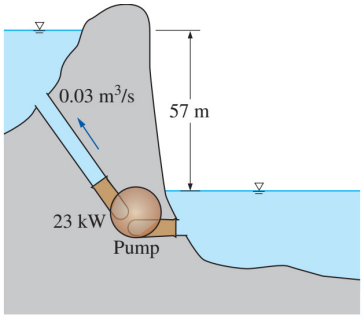
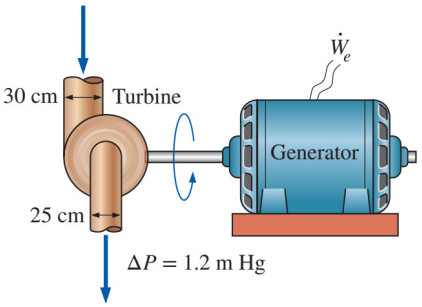
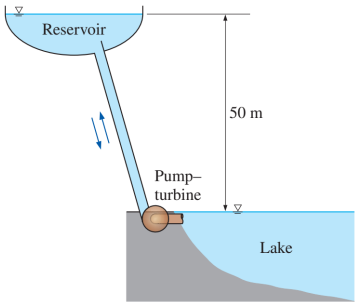
5–80 Water is pumped from a lower reservoir to a higher reservoir by a pump that provides 23 kW of useful mechanical power to the water. The free surface of the upper reservoir is 57 m higher than the surface of the lower reservoir. If the flow rate of water is measured to be 0.03 m^3/s, determine the irreversible head loss of the system and the lost mechanical power during this process.



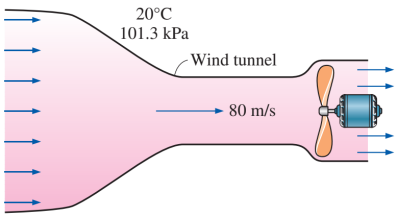
5–78 Water enters a hydraulic turbine through a 30-cm-diameter pipe at a rate of 0.6 m^3/s and exits through a 25-cm-diameter pipe. The pressure drop in the turbine is measured by a mercury manometer to be 1.2 m. For a combined turbine– generator efficiency of 83 percent, determine the net electric power output. Disregard the effect of the kinetic energy correction factors.



5–85 The demand for electric power is usually much higher during the day than it is at night, and utility companies often sell power at night at much lower prices to encourage consumers to use the available power generation capacity and to avoid building new expensive power plants that will be used only a short time during peak periods. Utilities are also willing to purchase power produced during the day from private parties at a high price.



5–103 A wind tunnel draws atmospheric air at 20°C and 101.3 kPa by a large fan located near the exit of the tunnel. If the air velocity in the tunnel is 80 m/s, determine the pressure in the tunnel.



5–105 A tank with openings 1, 2, and 3 is moving to left at a speed of 25 km/h. Knowing that $D_1 = D_2 = 20$ cm and $D_3 = 10$ cm, find the volume flow rate at each opening. Assume a frictionless incompressible flow. Air velocity far from the tank is assumed to be zero.