

P2055.

Assignment 2

1. A solid cube of silver (density = 10.5 g/cm^3) has a mass of 90.0 g. (a) What is the resistance between opposite faces of the cube? (b) Assume each silver atom contributes one conduction electron. Find the average drift speed of electrons when a potential difference of $1.00 \times 10^{-5} \text{ V}$ is applied to opposite faces. The atomic number of silver is 47, and its molar mass is 107.87 g/mol.
2. The resistance of a platinum wire is to be calibrated for low temperature measurements. A platinum wire with resistance 1.00Ω at 20.0°C is immersed in liquid nitrogen at 77 K (-196°C). If the temperature response of the platinum wire is linear, what is the expected resistance of the wire at -196°C ? ($\alpha_{\text{platinum}} = 3.92 \times 10^{-3} / ^\circ\text{C}$)
3. A 500-W heating coil designed to operate from 110 V is made of Nichrome wire 0.500 mm in diameter. (a) Assuming that the resistivity of the Nichrome remains constant at its 20.0°C value, find the length of wire used. (b) What if? Now consider the variation of resistivity with temperature. What power will the coil of part (a) actually deliver when it is heated to 1200°C ?
4. In the circuit in Fig.1 determine the current in each resistor and the voltage across the 200Ω resistor.

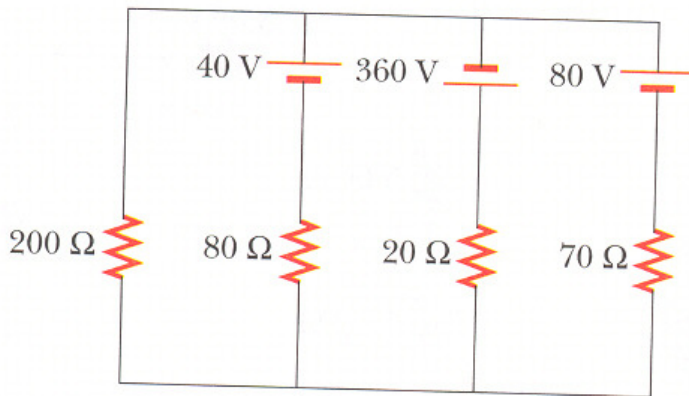


Fig.1

5. A $10\text{-}\mu\text{F}$ capacitor is charged by a 10-V battery through a resistance R. The capacitor reaches a potential difference of 4.00 V in a time 3.00 s after charging begins. Find R.
6. A 2.00 nF capacitor with an initial charge of $5.10 \mu\text{C}$ is discharged through a $1.30\text{-k}\Omega$ resistor. (a) Calculate the current in the resistor $9.00 \mu\text{s}$ after the resistor is connected across the terminals of the capacitor. (b) What charge remains on the capacitor after $8.00 \mu\text{s}$? (c) What is the maximum current in the resistor?
7. The following equations describe an electric circuit:
$$-I_1 (220 \Omega) + 5.80 \text{ V} - I_2 (370 \Omega) = 0$$
$$+I_2 (370 \Omega) + I_3 (150 \Omega) - 3.10 \text{ V} = 0$$
$$I_1 + I_3 - I_2 = 0$$
(a) Draw a diagram of the circuit. (b) Calculate the unknowns and identify the physical meaning of each unknown.