

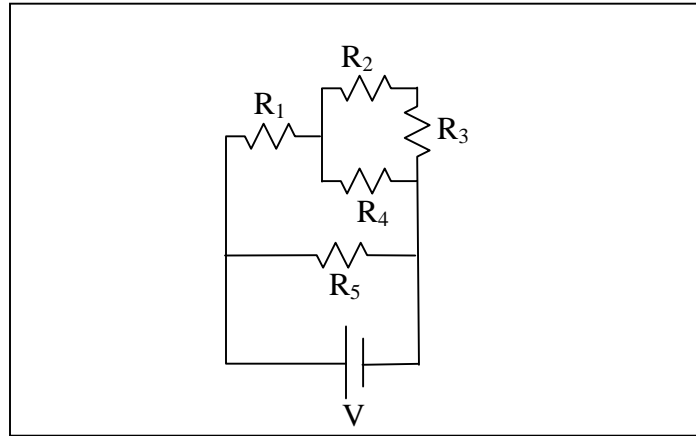
Physics 206b

Homework Assignment VI
Due September 28, 2007

Problems #1 and #2 are transferred from the previous assignment.

1. In your previous assignment, you calculated the total capacitance of a pair of parallel plates separated by air. To repeat: Consider the plates to be circular with a radius of 1 cm. Take the separation between them to be 1/2 mm. What is the maximum charge that could be put on this above capacitor if the dielectric strength of air is $3 \frac{kV}{mm}$?
2. Now, the gap in the capacitor above is filled with paper (see table 19.1 in your text). What is the maximum charge that could be put on the capacitor in this case? What voltage difference would that require?
3. A current of 2 amps flows through a wire. How many electrons per second will pass through a given cross section of the wire?
4. Copper has a resistivity of $\rho = 1.72 \times 10^{-8} \Omega \cdot m$. 22 Gauge wire has a diameter of 0.64516 mm. If a potential difference of 1.5 V is placed across the ends of a length of 22 Gauge copper wire, what length of wire will be needed to dissipate $\frac{1}{2}$ watt of power?
5. A battery delivering 12 V is connected to a coil of wire with a resistance of 3 ohms. The coil of wire is immersed in 250 grams of water initially at 20° C. How long will it take for the water to reach the boiling point?

6. Find the current that passes through each of the resistors in the circuit below. Also, find the total resistance of the circuit. Take the resistances to be as follows: $R_1 = 3\Omega$, $R_2 = 5\Omega$, $R_3 = 7\Omega$, $R_4 = 11\Omega$, $R_5 = 13\Omega$. Take $V=9$ V.



7. For each of the resistors in the above circuit, find the potential (relative to zero) at the point immediately following each resistor.