

CS/EE 3700 — Digital System Design
Assignment 1: Electronics Review Questions
Due Thursday Jan 17th, 2008 at 5:00pm

Answer the following questions. You must show your work to receive credit. Hand in your solutions to the CS/EE3700 slot in the homework box outside the School of Computing office.

1. What is the maximum current that a 1-W 65-k Ω resistor can safely conduct?
2. What is the maximum voltage that can be safely applied across a 1/2-W, 75- Ω resistor?
3. Solar energy falling on the earth (i.e. sunlight) has a maximum power of about 1 kwatt/meter². Typical inexpensive consumer solar panels that convert sunlight into electrical energy are about 13% efficient. How many square meters of solar panels would it take to make toast if you have a 1600w toaster?
4. Suppose you have a 120v voltage source wired in series with five resistors. The resistors have values of 5, 6, 7, 8, and 9 Ω . Find the voltage across the 6 Ω resistor.
5. For how long can a 4.5-Ah (Amp-Hour), 1.5v flashlight battery deliver 100mA?
6. How much power does an electric clock require if it draws 24.5 mA from a 110v line?
7. Consider a circuit with a 240v source, and three resistors wired in series with values of 12-, 20-, and 16- Ω . Find the current out of the positive terminal of the battery, and the voltages across each of the resistors.
8. Suppose you have a 60W, 120V light bulb that, for some reason, you want to place in a 240v line. What is the resistance and minimum power rating of the series resistor that is required if the light bulb is to operate under rated conditions?
9. Determine the total resistance of a series/parallel combination of resistors with the following connection (the "+" means a serial connection and the || means a parallel connection, and the parallel operator has the highest precedence): $(4 + 24 || 12) || 6$
10. A 2 μ F capacitor is initially charged to 300v. Then it is discharged through a 270-k Ω resistor. What is the capacitor voltage at 0.25s after the capacitor starts to discharge?
11. Consider a series connection of a switch, a 200v source, a 2-M Ω resistor, and an uncharged 0.1 μ F capacitor. Find the capacitor voltage at 0.1s after closing the switch.