PHYS 212 Homework Assignment

Chapters 9

Problem 1 You are wiring up your house and want to make a fuse that will "blow" when the current exceeds 2 A. The available material melts at a current density of 200 A/cm^2, what diameter wire must you use so that your fuse will blow at the necessary current?

Problem 2 A wire has a resistance of 10 Ω. If the length of the wire is doubled, and the radius of the wire is halved,

(a) how does the resistivity change?

(b) what is the new *resistance*?

(c) does the maximum allowed current through the wire increase or decrease?

Problem 3 A 1 V difference is placed across 1 km of copper wire of radius 1 mm. How much charge drifts through an arbitrary cross section in 1 s?

Problem 4 An unknown resistor is connected to a 6 V battery. The energy is dissipated at a rate of 2 W.

(a) What is the resistance?

(b) How much power would this resister dissipate when connected to a 12 V battery?

(c) If two of these resistors were connected in series, how much power would be dissipated with a 6 V battery?

Problem 5 The air conditioner (compressor and fan) on your car requires 15 A from the 12 V alternator. The alternator converts mechanical energy (from the engine) into electrical energy. If this conversion efficiency is only 75%, how much power does the engine need to generate to run the air conditioner on your car?