PHYS 2102

Exam 2

Spring 2003

Dr. Aktas

Name :_____

SS # : _____

You have five questions: 20 points each.

This is a closed book exam. I understand I am not to use any notes or information other than on this exam sheet. I may use a pocket calculator but only for the purpose of numerical calculation. I accept the responsibility to know and observe the requirements of the UNC-Charlotte Code of Student Academic Integrity.

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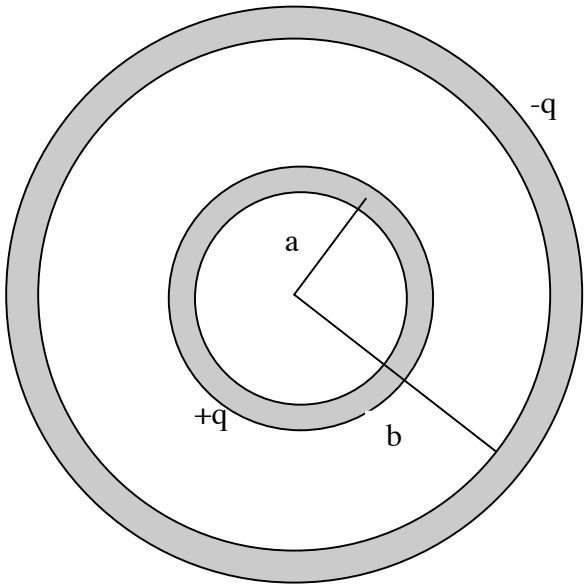
Signature

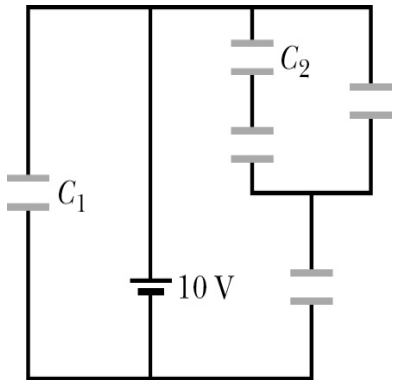
Good luck

Show all of your work. Do not skip steps. First write down the relevant equations then substitute the numbers if necessary.

1. Consider a spherical capacitor with inner radius “a” and outer radius “b”. It is charged to q Coulombs. Calculate its capacitance in terms of a, b and q. Show your all steps.



2. In figure below the battery has a potential difference of 10 V and the five capacitors each have capacitance of 10 μF. What is the charge on capacitor 1 and capacitor 2?

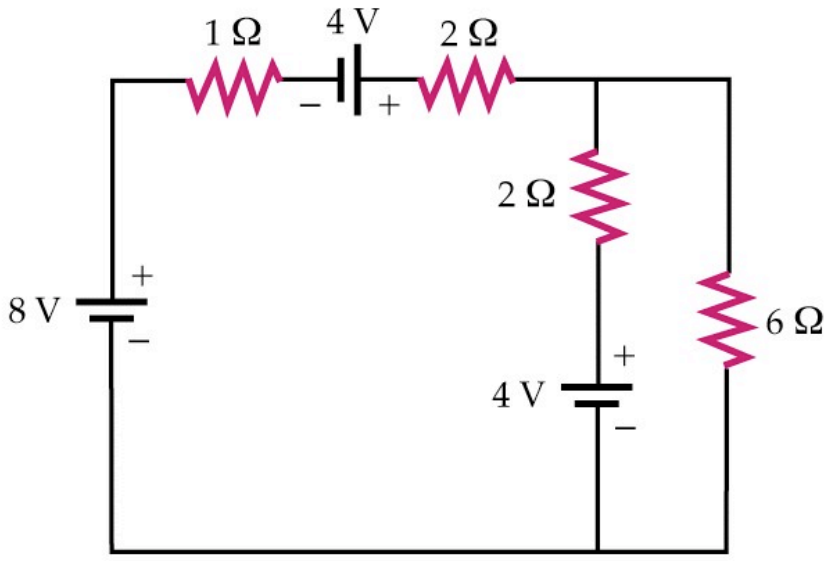


3. The current density across a cylindrical conductor of radius R varies in magnitude according to the equation

$$J = J_0(1 - r / R)$$

where r is the distance from the central axis. Thus, the current density is a maximum J_0 at that axis (r = 0) and decreases linearly to zero at the surface (r = R). Calculate the current in terms of J_0 and the conductor's cross-sectional area $A = \pi R^2$.

4. For the circuit in Figure below, find (a) the current in each resistor, (b) the power supplied by each emf, and (c) the power dissipated in each resistor.



5. A certain wire has a resistance R. What is the resistance of a second wire, made of the same material, that is half as long and has half the diameter.