PHYS 2102-02

Exam 2

Fall 2001

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.

_____

___

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. In figure below , the battery has a potential difference of 20 V. Find (a) the equivalent capacitance of all the capacitors and (b) the charge stored on that equivalent capacitance. Find the potential across and charge on (c) capacitor 1, (d) capacitor 2, and (e) capacitor 3.
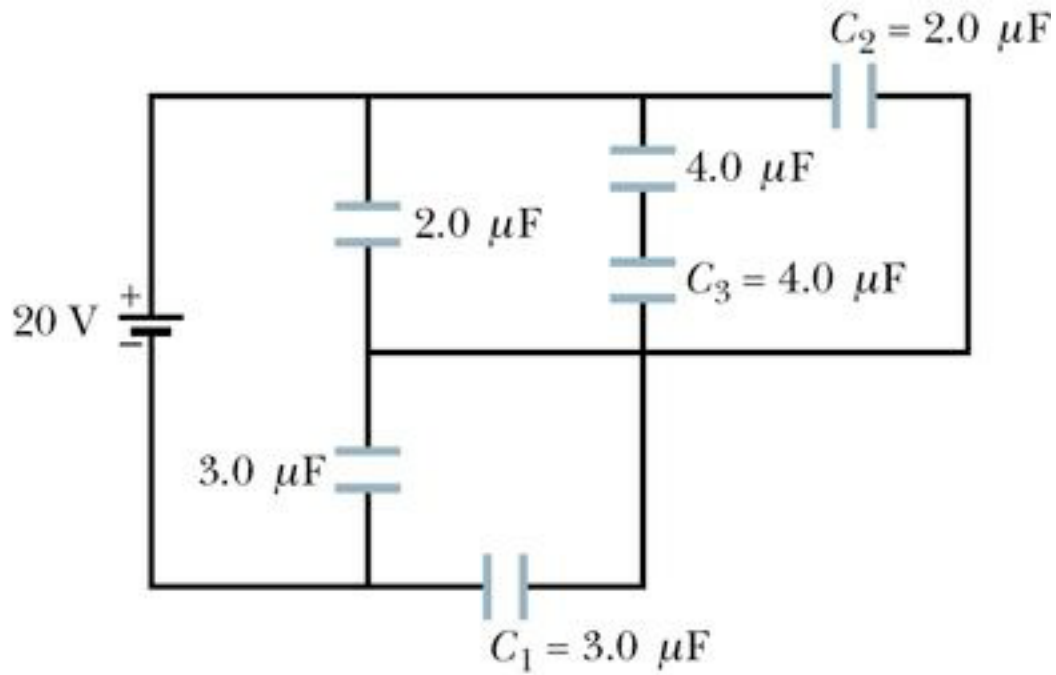
2. A resistor has the shape of a truncated right-circular cone. The end radii are a and b, and the altitude is L. If the taper is small, we may assume that the current density is uniform across any cross section. (a) Calculate the resistance of this object. (b) Show that your answer reduces to $\rho(L/A)$ for the special case of zero taper (that is, for a = b).
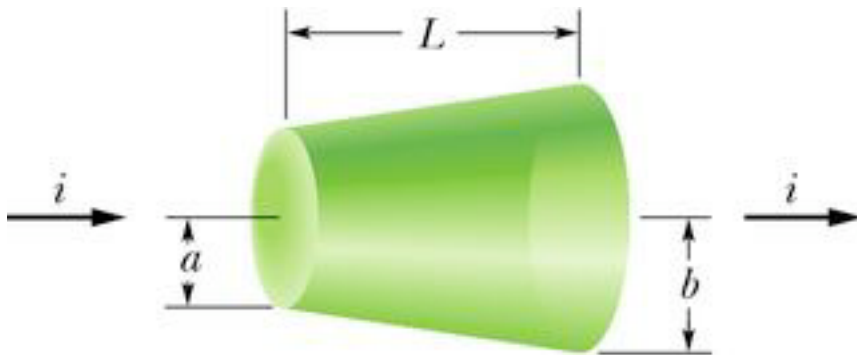
3. In figure below , $\varepsilon_1 = 3.00$ V, $\varepsilon_2 = 1.00$ V, $R_1 = 5.00$ Ω, $R_2 = 2.00$ Ω, $R_3 = 4.00$ Ω, and both batteries are ideal. What is the rate at which energy is dissipated in (a) R_1, (b) R_2, and (c) R_3? What is the power of (d) battery 1 and (e) battery 2?
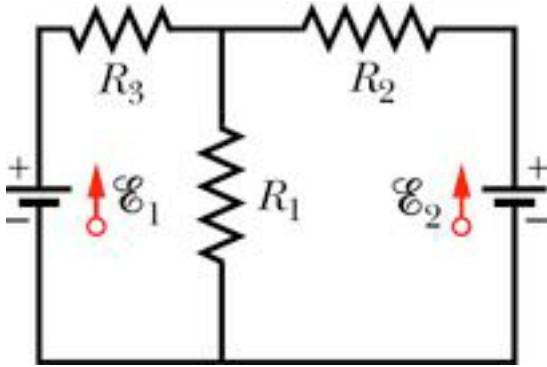
4. In the circuit shown below , the curved segments are arcs of circles of radii a and b with common center P. The straight segments are along radii. Find the magnetic field at point P, assuming a current i in the circuit.
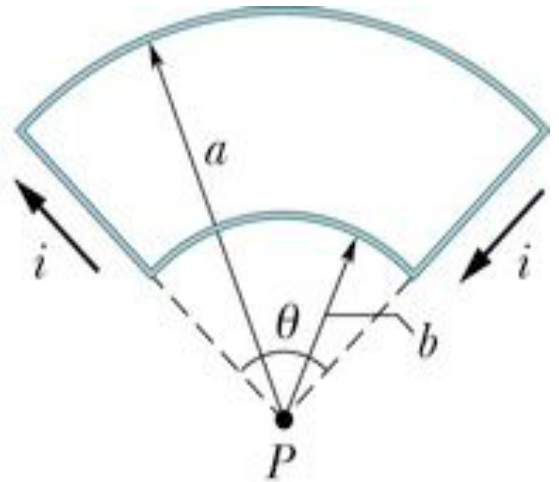
5. Calculate the magnetic field of a toroid with radius R, number of turns N, and current
i. Show your all steps.