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PHY 2049 Physics for Engineers and Scientists II
Dr. J. B. Bindell

EXAMINATION #2

INSTRUCTIONS: *Be sure to write your name on the top of **EVERY page** of this examination because pages can be separated during the grading process. Answer each question carefully and neatly so that it can be easily read and followed. Answers without backup will be considered wrong even if the answer itself is correct. Show all work. Try not to get hung up on a single problem. Answer the questions that you think you understand first and then return to complete the other problem(s). You may use the back of the page if you need it but be sure to mention this on the front! Good luck.*

$$\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 / \text{Nm}^2$$

$$k = 9 \times 10^9 \text{ Nm}^2 / \text{C}^2$$

Problem #1 (30):

A wire of radius R has a non-uniform current density that is given by the expression:

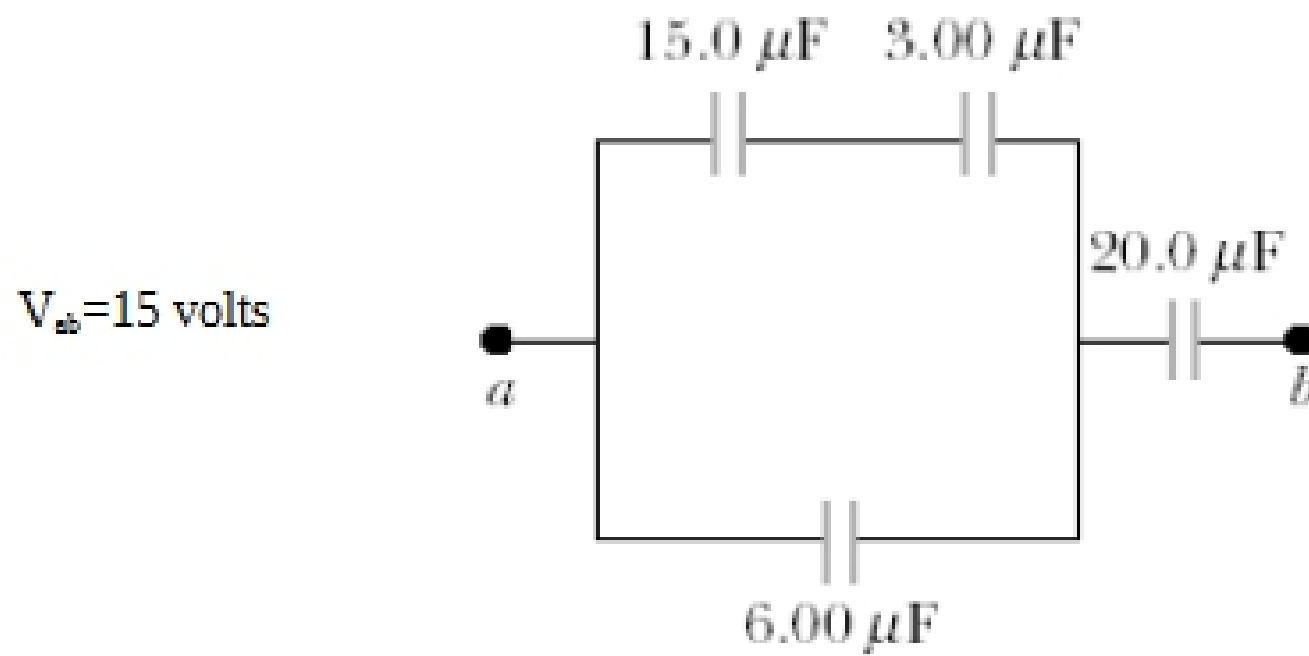
$$J = Ar^2.$$

What is the TOTAL current flowing through the wire?

NAME _____

Problem #2 (35):

Four capacitors are connected as shown in the Figure below. (a) Find the equivalent capacitance between points a and b . (b) Calculate the charge on each capacitor if $\Delta V_{ab} = 15.0 \text{ V}$.



NAME _____

Problem 3 (35):

Consider the array of charges shown in the diagram below.

(a) Calculate the energy required to assemble the array of charges shown in the Figure if $a = 0.200$ m, $b = 0.400$ m, and $q = 6.00 \mu\text{C}$.

(b) Consider the $-2q$ particle in the upper right hand corner of the diagram. If it is suddenly released, calculate the maximum kinetic energy it will have if its mass is 2×10^6 Kg.

