EXAM II Physics 208 2017

Last Name.....First Name.....Section Number.....

USEFUL INFORMATION

For two point particles

$$\vec{F} = \frac{1}{4\pi\epsilon_0}\frac{q_1 q_2}{r^2}\hat{r}$$

$$\frac{d\vec{r}}{dt} = \frac{dx}{dt}\vec{i}_x + \frac{dy}{dt}\vec{i}_y = \frac{dr}{dt}\vec{i}_r + r\frac{d\theta}{dt}\vec{i}_\theta$$

$$V(\vec{r}_2) - V(\vec{r}_1) = -\int_{\vec{r}_1}^{\vec{r}_2} \vec{E}\cdot d\vec{r}$$

$$C = \frac{Q}{V} \qquad R = \rho\frac{l}{A}$$

$$\oint \vec{E}\cdot d\vec{S} = \frac{Q_{inside}}{\epsilon_0}$$

$$V = iR \qquad \vec{E} = \rho\vec{j}$$

For parallel plates $C = \frac{A\epsilon_0}{d}$

WARNING: In any circuit problem, failure to indicate the direction of currents and/or the failure to indicate where charges are located on capacitors will result in no credit being given.

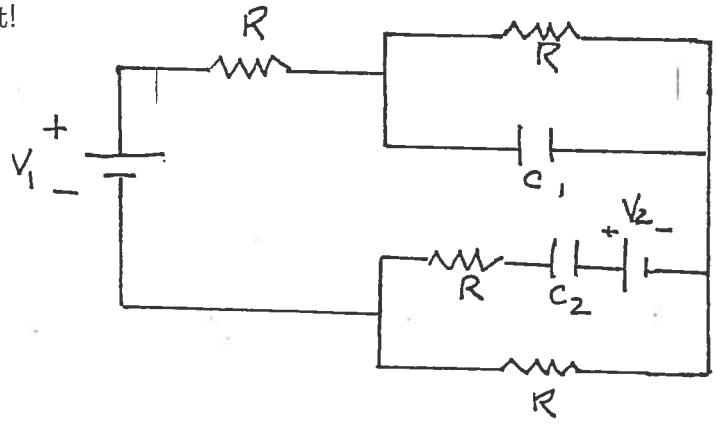
1.

2.

3.

4.

1. (25 points)In the circuit below, all the $R's$, $C's$ and $V's$ are known. The circuit was put together a long time ago. Find the currents in each resistor and the charges on the capacitors. You must clearly indicate what you are doing or you will receive no credit!

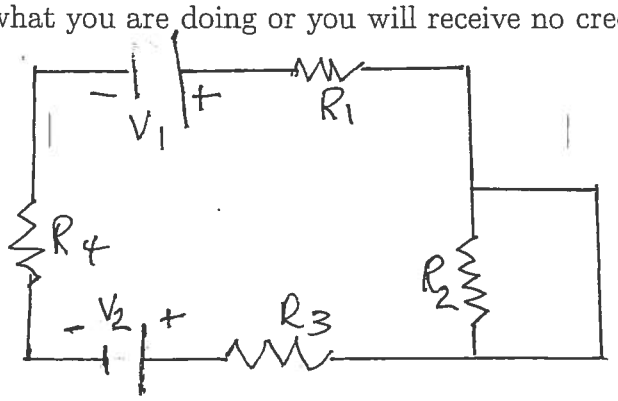


Laws or Definitions

Application

2 points Result: Evaluate each current and the charges if $R = 3\Omega$, $V_1 = 12volts$, $V_2 = 2volts$,$C_1 = 2\mu f$ and $C_2 = 4\mu f$.

2. (25 points)In the circuit below, all the $R's$ and $V's$ are known. The circuit was put together a long time ago. Find the currents in each resistor. You must clearly indicate what you are doing or you will receive no credit!

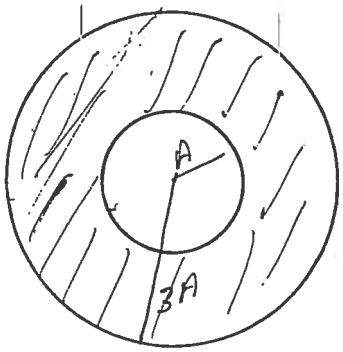


Laws or Definitions

Application

2 points Result: Evaluate each current and the charges if $R_1 = 2\Omega$, $R_2 = 8\Omega$, $R_3 = 4\Omega$, $R_4 = 6\Omega$, $V_1 = 12volts$, and $V_2 = 6volts$.

3. (25 points) A negative charge, $-Q$, is uniformly spread in a spherical shell with inner radius A and outer radius 3A. Find difference in the electric potential between the center of the shell and a point a distance 2A from the center.

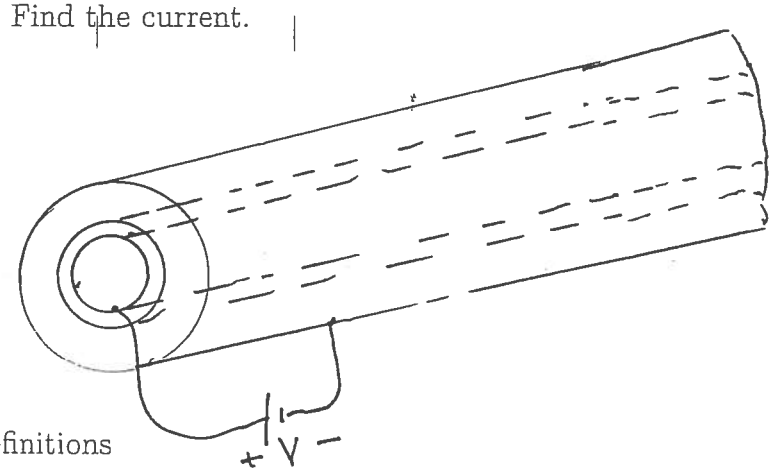


Laws or Definitions

Application

Result

4. (25 points)A cylindrical shell is made of material with constant resistivity ρ_1. The shell has inner radius a and outer radius b. It is surrounded by another cylindrical shell with inner radius b and outer radius f, and constant resistivity ρ_2. A battery with known voltage V is connected as shown so that a constant current is made to flow radially out from the inner surface to the outer. The length of the cylindrical shells is W. Find the current.



Laws or Definitions

Application

Result