

Physics 2611: General Physics II

NAME: _____

Midterm II

- 1.1) For the charges shown, which point “A” or “B” has the larger potential?
- 1.2) A wire has a diameter of .0001 m and a length of 10 m. The resistivity of the wire is 4×10^{-8} Ohm-m. Compute the resistance of the wire in Ohms.
- 1.3) A wire of diameter .001 m has a current of .75 amps flowing through it. If the electric field in the wire is $\vec{E} = 2.1 \times 10^{-4}$ volts per meter, what is the resistivity ρ (in Ohm-m) of the material making up the wire?
- 1.4) A 1 nF capacitor is connected in series with two 1m x 1m metallic plates separated by .001 m. The combination is connected to a 123 V source. Compute the amount of charge on the positive metallic plate.
- 1.5) A 1.00F capacitor is charged to 5.0V. It is then connected (as shown) to a 2.00F capacitor charged to 1.5 V. What is the final voltage of the system?
- 1.6) Compute the change in energy of the system before and after the connection in problem (1.5) above.
- 1.7) A charge Q is held at a distance d above a large (initially uncharged) metal plane, as shown. Draw clearly a series of electric field lines and a few equipotential surfaces.

1.8) You have a $1\ \Omega$, a $2\ \Omega$ and a $4\ \Omega$ resistor. Write down all the possible resistor values you can make, alone or in combinations.

2) Charges (a) $4\ \mu\text{C}$, (b) $-5\ \mu\text{C}$, (c) $-1\ \mu\text{C}$ and (d) $3\ \mu\text{C}$ are placed as follows (see dimensions in the figure below.) Compute the total energy needed to assemble the four charges.

3) For the circuit pictured, compute the current in the $2\ \Omega$ resistor and the power dissipated $3\ \Omega$ resistor.

Extra Credit: House voltage is 115V. Suppose that we connect a 40W filament light bulb in series with a 100W filament light bulb (assume that the resistance of the lightbulb is fixed and is not a function of temperature of the filament). What is the total power consumed by the combination and which bulb is brightest?