PHYSICS 1020
Homework #5

(Due March 20, 2017)

1. (KJF 23-35) You need a capacitance of 50 μF, but you don't happen to have a 50 μF capacitor. You do have a 75 μF capacitor. What additional capacitor do you need to produce a total capacitance of 50 μF? Should you join the two capacitors in parallel or in series?

2. What is the capacitance of a parallel-plate capacitor, whose plates are circular and of diameter 4.00 cm, and whose plates are 0.2 mm apart? Assume the space between the plates is filled with mica.

3. Suppose that you have a 680-Ω, a 940-Ω, and a 1.20-kΩ resistor. What is (*a*) the maximum, and (*b*) the minimum resistance you can obtain by combining these?

4. A *discharging RC* circuit has $R = 6.7$ kΩ and $C = 3.0$ μF. The capacitor is at voltage V_0 at $t = 0$, when the switch is closed. How long does it take the capacitor to discharge to 1.0% of its initial voltage?

5. Two magnetic poles of pole strength $+47.0$ A m are separated by a distance of 1.00 cm. What is the force between the two poles?

6. Consider a small wire of length 1.00 cm carrying an electric current of 2.0 amperes, lying in the x-y plane. The wire lies at $y = -5.00$ cm, and its current is flowing in the $+x$ direction. What is the direction and magntitude of the magnetic field at the origin due to the small wire?