

Homework 4

Chapter 20

Problem 41. Four capacitors are connected as shown in Figure P20.41. (a) Find the equivalent capacitance between points a and b . (b) Calculate the charge on each capacitor, taking $\Delta V_{ab} = 15.0$ V

Problem 49. Two capacitors, $C_1 = 25.0$ μF and $C_2 = 5.00$ μF , are connected in parallel and charged with a $\Delta V = 100$ V power supply. (a) Draw a circuit diagram and calculate the total energy stored in the two capacitors. (b) What potential difference would be required across the same two capacitors connected in series so that the combination stores the same energy as in (a)? Draw a circuit diagram for this circuit.

Problem 69. The x axis is the symmetry axis of a stationary, uniformly charged ring of radius R and charge Q (Fig. P20.69). A particle with charge q and mass M is located at the center of the ring. When it is displaced slightly, the point charge accelerates along the x axis to infinity. Show that the ultimate speed of the point charge is

$$v = \left(\frac{2k_e Q^2}{MR} \right)^{1/2} \quad (1)$$