NAME & ID

PH 102 / LeClair Summer II 2009

Quiz 4: Capacitors and Such

$$Q = C\Delta V \qquad \text{Energy} = \frac{1}{2}Q\Delta V = \frac{1}{2}C\,(\Delta V)^2 = Q^2/2C$$

$$C = \epsilon_o A/d \quad \text{parallel plate} \qquad \epsilon_o = \frac{1}{4\pi k_e} = 8.85 \times 10^{-12}\,C^2/N\cdot m^2 \qquad e = 1.60218 \times 10^{-19}\,C$$

$$\frac{1}{C_{\text{eq, series}}} = \frac{1}{C_1} + \frac{1}{C_2} \qquad C_{\text{eq, par}} = C_1 + C_2$$

1. A fully charged defibrillator contains $1.20\,\text{kJ}$ of stored electrical energy in a $1.1 \times 10^{-4}\,\text{F}$ capacitor. Find the voltage needed to store $1.20\,\text{kJ}$ in the unit.

2. Five $5\,\mu\text{F}$ capacitors are connected in parallel. What is the equivalent capacitance? How about if all five are connected in series?

3. I have two batteries and three capacitors. How should I connect them to store the most electrical energy? Describe in words or as a circuit diagram as you choose.