

PHYSICS 231 – SAMPLE TEST # 2

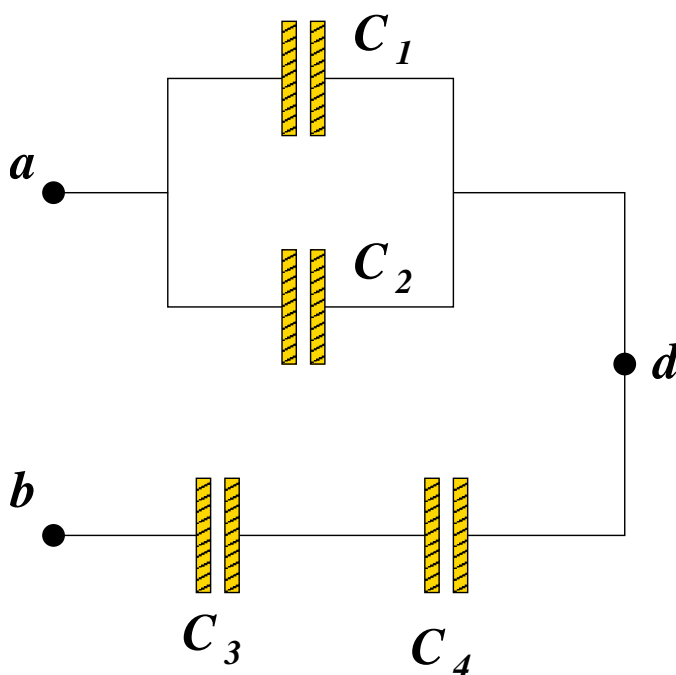
Problem 1

- (a) The two plates of a capacitor are given charges $+Q$ and $-Q$. The capacitor is then disconnected from the battery so that the charges on the plates cannot change. The capacitor is then immersed in a tank of oil. Does the electric field between the plates increase, decrease, or stay the same? Explain.
- (b) When an electric current passes through a resistor, the current loses energy, generating heat in the resistor. Does the current lose kinetic energy, potential energy, or a combination of the two? Explain.
- (c) In which 120-V light bulb does the filament have greater resistance, a 60-W bulb or a 120-W bulb? Explain.
- (d) Is it possible to have a circuit in which the potential difference across a battery in the circuit is zero? If so, give an example. If not, explain why not.

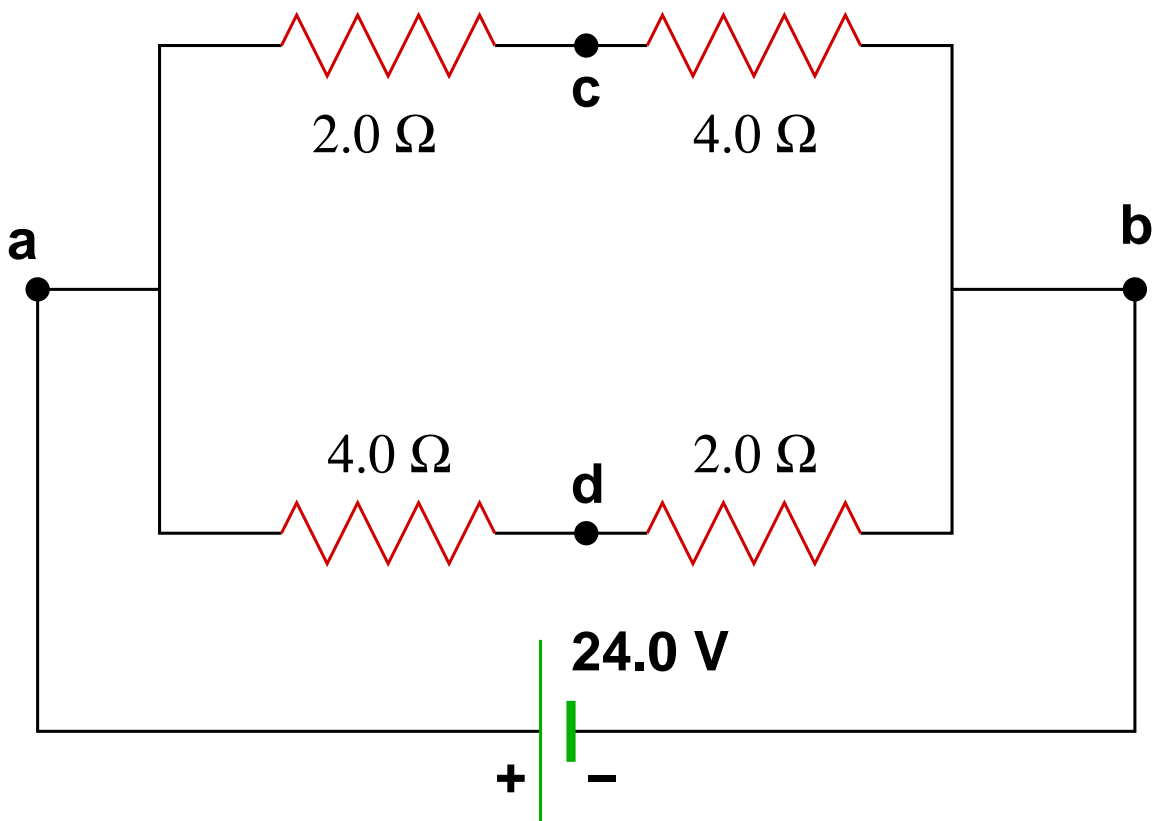
Problem 2

The capacitances are $C_1 = 8 \text{ nF}$, $C_2 = 12 \text{ nF}$, $C_3 = 8 \text{ nF}$ and $C_4 = 12 \text{ nF}$. The voltage between points a and b is $V_{ab} = 300 \text{ V}$.

- (a) Find the equivalent capacitance between a and b .
- (b) Find the charges on the plates of each capacitor.
- (c) What is the voltage V_{ad} between points a and d ?
- (d) Calculate the energy stored in each capacitor.



Problem 3



- (a) What is the equivalent resistance between points a and b ?
- (b) What are the currents through points a , b , c and d ?
- (c) What are the potential differences V_{ab} and V_{cd} ?