**CAPACITORS**

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PHY 134

SECTION 07

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**Aim:**

To learn how to use and understand the combinations of capacitors in series and in parallel with the aid of an oscilloscope and to find the capacitance of an unknown capacitor using a known capacitor.

**Procedure:**

**1)** First we connect all the capacitors and the batteries using the DPDT switch to the Oscilloscope as shown in the circuit diagram for the parallel capacitors. We then put the switch into position 1, and set the line on the oscilloscope to be 0, and then switch the switch to position 2. Record the value and repeat 5 more times for different value of known capacitance. Use these values to get the uncertainty and to calculate the unknown capacitance.

**2)** Next we disconnect everything and connect everything in as shown in the circuit diagram for series. Set C2 to 5µC and flip the switch from position 1 to 2 and record the Voltage across C1. Repeat then change to oscilloscope leads to measure C2 and not C1 and repeat. Derive an equation for V1 and V2 as a function of C1 and C2 and V0.

**Data Analysis:**

Using the collected data we determine the capacitance of the unknown capacitance was 3.50 µF ± 0.1 µF

**Q1) Why does charge flow from charged capacitor to uncharged.**

Charge flows from region of higher potential which is the charged capacitor to lower potential which is uncharged capacitor.

**Q2)**  **What is different in part 2 circuit. Is this a series configuration?**

Unlike part one circuit where only one capacitor was connected to the battery, in this part both capacitors are connected to the battery in series.

**Q3) Why does voltage decay?**

Voltage in the capacitor decays over time following an exponential system which is V=Vmax \* e^(it/T)

**Q4) Does the obtained C1 correctly predict the voltages V1 and V2**

Using the given C1 and equations, we can predict a value for V1 to be 0.63±0.02V and V2 to be 0.89±0.02V. Using the circuit we obtain V1 to be 0.65V and V2 to be 0.91V which is consistent with the predicted values. Hence our C1 is fairly accurate.

**Conclusion:**

Using various experiments we successfully calculated the value of an unknown resistance using parallel configuration and verified it using Series configuration.

