Capacitance Tutorial

Parallel Capacitance Circuits

When two capacitor are connected in Parallel, The equivalent capacitance is given by

$C=C_1 + C_2$

The voltage is same across the both the capacitor but charge is not and it depends on the capacitance

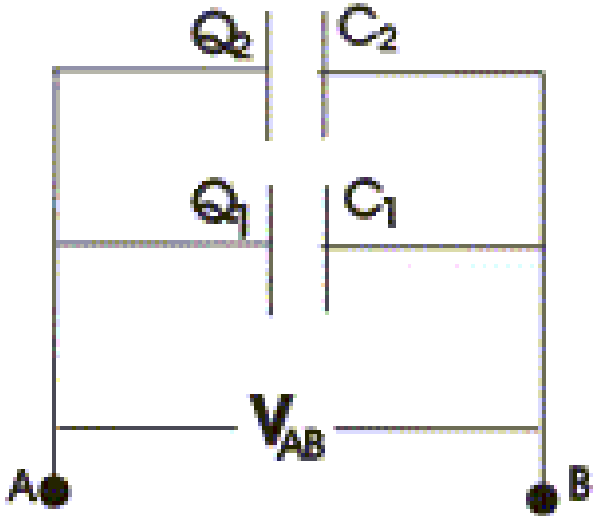


Figure 6

Series Capacitance Circuits

When two capacitor are connected in series , the equivalent capacitance is given by

$1/C=1/C_1{}^{+}1/C_2$

The charge on the both the capacitor is same but Voltage is different

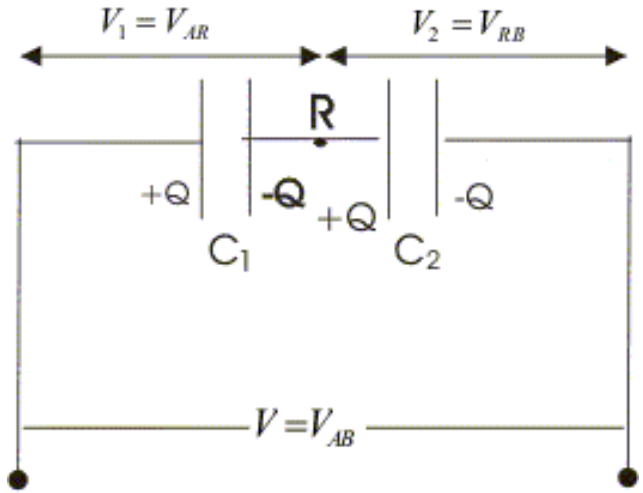
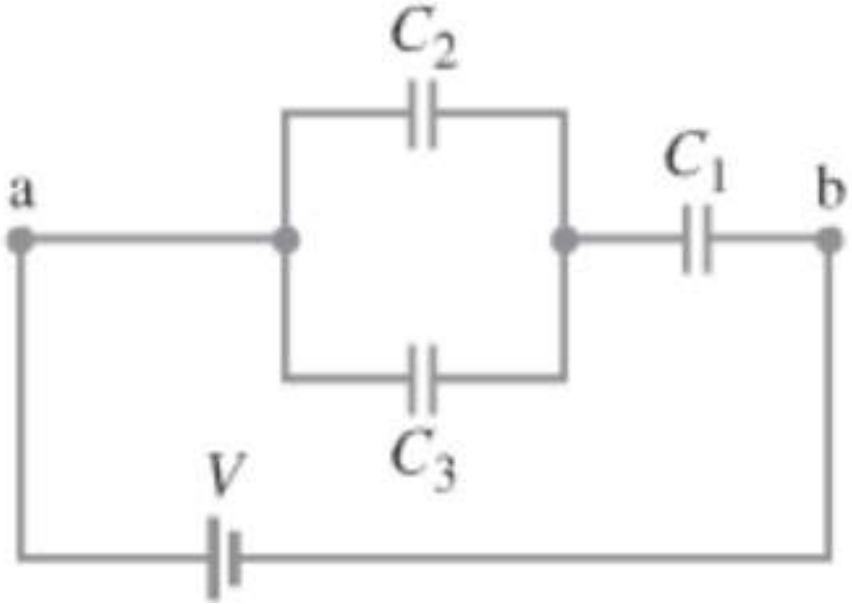


Figure 7

Capacitance Question

Find the equivalent capacitance of the circuit?
Find the charge on the capacitor C_1?
Given $C_1=C_2=C_3=C$

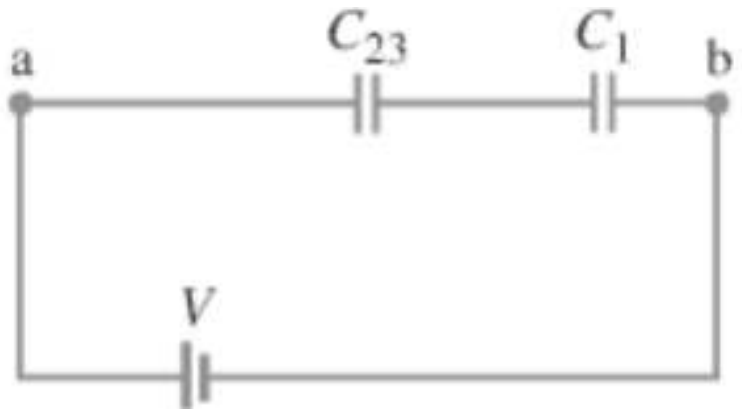


Solution

We need to make of parallel series capacitance formula as stated in previous slide

The Capacitor C_2 and C_3 are in parallel , So we can replace those capacitor by the equivalent capacitance

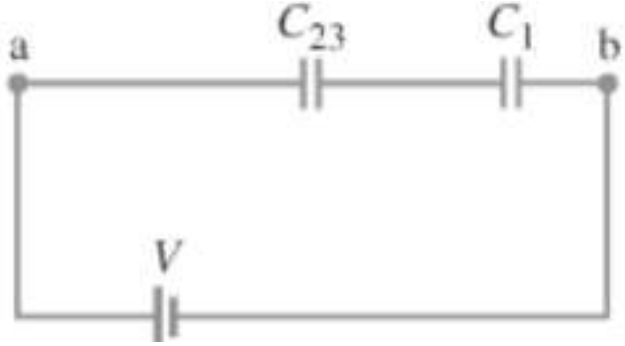
$C_{23} = C_2 + C_3 = 2C$



Solution Continued

Now C_{23} and C_1 are in series , So we can replace those capacitor by the equivalent capacitance

$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_{23}} = \frac{1}{C} + \frac{1}{2C} = \frac{3}{2C}$$



C_{eq}=2C/3

Now total charge in the circuit (Q) $=C_{eq}V=2CV/3$.

Now since C_1 is in series with the whole circuit, The charge on C_1 will be 2CV/3

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