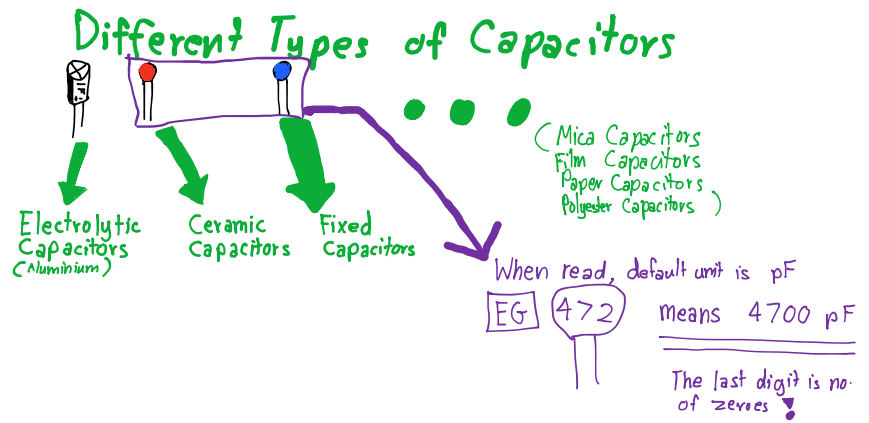


Unit 6: Capacitors

Monday, 24 March 2025 12:02 PM

- Capacitors are electronic components that store charge
 - ↳ Something like batteries $+$ $-$
 - ↳ But different in terms of execution
 - ↳ Voltage Across capacitor depends on amt of charges stored inside
- Capacitor Structure
 - ↳ Capacitors have 2 layers of conductive material separated by an insulator
 - ↳ Called a Dielectric
- How it works
 - ↳ To charge a capacitor, connect it to a source
 - ↳ Electrons flow away from the metal plate of the capacitor towards the terminal of the source
 - ↳ To discharge a capacitor, connect it to a load
 - ↳ Electrons flow



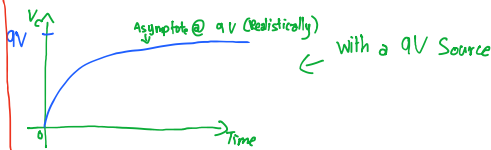
- Capacitance
 - ↳ Capacitance is the amt of charge the capacitor can hold before its voltage reaches EMF of Source
 - charges up **SLOWER**, but gains **MORE** charges
 - eg. A capacitor of 10 μF means it can hold 10 $\mu\text{C}/\text{V}$

Formula of Capacitance

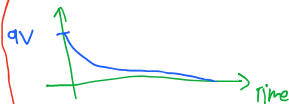
$$C = \frac{Q}{V}$$

Where: C = Capacitance
 Q = Charges stored
 V = Voltage

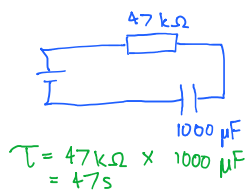
- Resistor - Capacitor Circuit
 - ↳ Circuit with a resistor & Capacitor in series
 - ↳ Charging graph is NON-LINEAR



Discharging Graph is NON-LINEAR



- ↳ Amt of time taken to reach a certain level is known as the TIME CONSTANT
 - ↳ After 1T, Capacitor is $\frac{1}{e}$ charged
 - ↳ After 5T, Capacitor is 99.3% charged (considered full)
 - ↳ Eg. Capacitor w/ capacitance of 1000 μF Source of 9V Resistor of 47 k Ω



FORMULA OF TIME CONSTANT

$$T = RC$$

Where T = Time Constant
 R = Resistance
 C = Capacitance