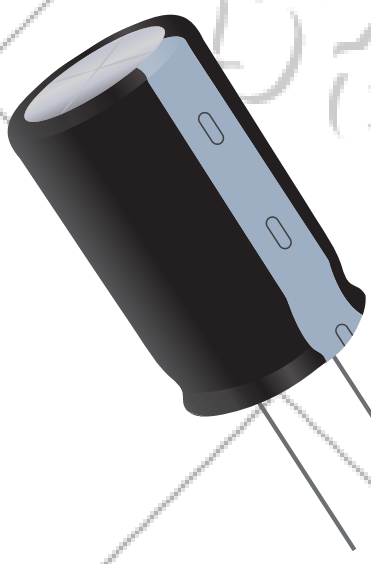


CAPACITANCE AND ENERGY STORAGE

By:Abdullah Alqassar 12B

WHAT IS A CAPACITOR ?

A common way for electrical systems to store energy is in a device known as a capacitor.
A capacitor gets its name from the fact that it has the capacity to store both electric charge and electrical energy.
In general, a capacitor is nothing more than two conductors, referred to as plates, separated by a finite distance.
When the plates of a capacitor are connected to the terminals of a battery, they become charged. One plate acquires a positive charge, +Q, and the other plate acquires an equal and opposite negative charge, −Q.

WHAT IS THE CAPACITANCE ?

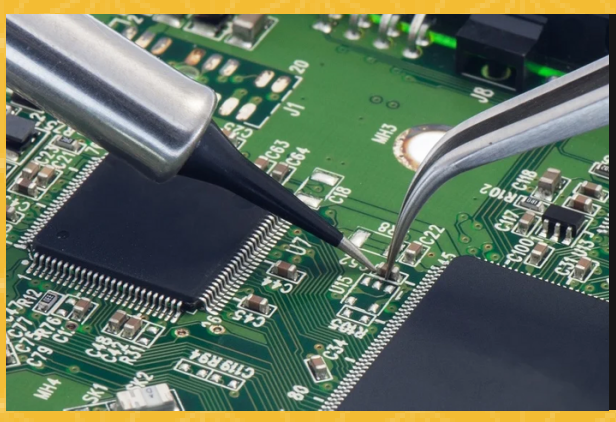
The capacitance is the ability to store charge or electric energy.
The ratio of the charge stored to the applied voltage can be identified as the ratio Q/V which is called the capacitance, C.
As the charge Q increases for a given voltage V, the greater the capacitance of the capacitor.

THE CAPACITANCE EQUATION

Capacitance = charge / electric potential difference , C = Q/V

SI Unit = coulomb/volt = farad (F) in honor of the English physicist Michael Faraday

In the equation above, Q is determined to be the magnitude of the charge on either plate and V is the magnitude of the voltage difference between plates. Due to this, the capacitance will always be positive.

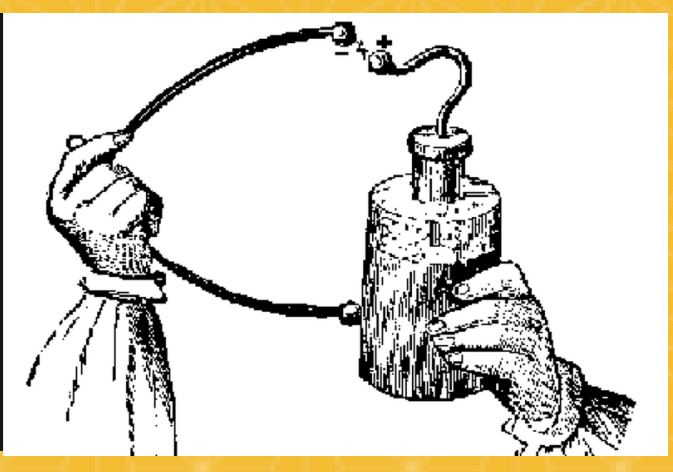


CRITICAL CAPACITOR

Capacitors are an important element in modern electronic devices. No cell phone or computer could work without capacitors.

THE FIRST CAPACTOR

The Leyden Jar was the first capacitor invented. The Leyden Jar was invented in 1745 by Pieter van Musschenbroek.



AFFECT OF SIZES AND SHAPES OF CAPACITORS

SIZES AND SHAPES

There are two main factors that affect the capacitor of the capacitance and they are plate area and plate separation.

AREA OF PLATES INCREASED

If the area between the two plates increases, the capacitance will increase. Therefore, distance is directly proportional to the capacitance.

PLATE SEPERATION DECREASED

If the area between the two plates decreases, the capacitance will increase. This is due to the fact that that a smaller separation between plates reduces the potential difference between them. Meaning less voltage is required to store a given amount of charge.

STORING ENERGY

As mentioned before, capacitors store more than just charge they also store energy. It can be shown that the total energy, PE, stored in a capacitor with charge Q and potential difference V is PE = 1⁄2QV
So, increasing a capacitor's charge or voltage increases its stored energy.

FUN FACTS

- A capacitor's conducting surfaces are made of different materials, including a thin film of conductive metal or aluminum.
- The negatively charged plate is known as the cathode and the positively charged plate is known as the anode.
- Capacitors with higher capacitance values are made from materials with a higher dielectric constant.
- Capacitors discharge very slowly, but many can store a charge for years.