Capacitance Tutorial

Parallel Plate capacitor

PhysicsCatalyst

What is Capacitance

1) *Capacitance is device used to stored energy and charge. It consists of two non touching plates which stores equal and opposite change*

2) *C is defined as*
   $C=Q/V$
3) *For parallel plate capacitor,*

$C=\varepsilon_0 A/d$
Where A is the area of cross-section of plate
d is the distance between the plates

With Dielectric in between the plates

$C=K\ \varepsilon_0 A/d$

Capacitance Continued….

4) The electric energy stored in capacitor is given by

Energy $= QV/2$

$= CV^2/2$ (*as* $Q=CV$)

$= Q^2/2C$ (*as* $V=Q/C$)

5) We can find various things with the help the above formula's

Capacitance Question

How much energy is stored by the electric field between the two square plates of a as the length of the side separated by the distance b. The charges on the plates are equal to q_0 and opposite in sign

Solution

This is a arrangement of the parallel plate capacitor

Here we need the find the electric energy stored

$Energy = QV/2 = CV^2/2 = Q^2/2C$

Here we know $Q = q_0$ And capacitance can be found out using the formula

$C = \varepsilon_0 A/d = \varepsilon_0 a^2/b$

$So\ energy = Q^2/2C$

- $$= \frac{q_0^2}{2(\varepsilon_0 a^2/b)^2} = \frac{q_0^2 b^2}{2\varepsilon_0^2 a^4}$$

For more tips and study material please visit our website http://physicscatalyst.com