



INTERMEDIATE

Capacitor

Hand Notes For JEE Mains, Advance, NEET UG, Class 11 & 12 etc...

Hand Notes

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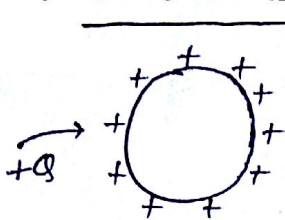
CAPACITOR

* C does not depend on Q & V .

The capacity of conductor to store charge on its shape & size.

* Dielectric strength of medium \rightarrow It is max electric field after which insulation of medium get punched. for air $= 3 \times 10^6 \text{ V/m}$

solid conducting sphere \rightarrow



$$V_{\text{sphere}} = \left(\frac{1}{4\pi\epsilon_0} \right) \frac{Q}{R}$$

$$V_{\text{sphere}} - V_{\text{infinite}} = \Delta V = \frac{Q}{(4\pi\epsilon_0)R}$$

$$Q = (4\pi\epsilon_0 R) \Delta V$$

$$C = 4\pi\epsilon_0 R$$

$$Q = C \Delta V$$

* In conductor

$$Q(\uparrow) = V(\uparrow)$$

means, charge (Q) \propto pot. (V)

Unit \rightarrow MKS $\rightarrow \text{C/volt}$, Farad (F)
 CGS \rightarrow stat farad
 ($1 \text{ F} = 9 \times 10^{11} \text{ stat.F}$)

Imp #

$C_{\text{earth}} = ?$

* Theoretical value \rightarrow By considering it conductor of $6370(6400) \text{ km}$

$$C = 711 \mu\text{F}$$

* Practically \rightarrow earth can accept unlimited charge so its capacitance is infinite (∞)

* capacitance of any earth conductor is infinite.

EX \rightarrow



capacitance = C
 take limited charge



capacitance = ∞
 take unlimited charge

$$\left\{ \text{b/c } C = \frac{Q}{V} = \frac{Q}{0} = \infty \right\}$$

potential energy stored in charge conductor \rightarrow
 Some external work is done during charging of conductor which is stored in form of pot. energy.

$$U = \frac{1}{2} C V^2 = \frac{1}{2} Q V = \frac{Q^2}{2C}$$

* p.e. \oplus only in charge conductor but capacitance \oplus in charge or, uncharge.