ELECTRIC CHARGES AND FIELDS (CHAPTER-1)

CHARGE:- It is the property of the body by virtue of which it shows both electric and magnetic behaviour.

REPRESENTATION- Q or q

- Charge is a scalar quantity
- SI unit - coulomb (C)
- CGS unit - st C (electrostatic unit of charge) $1C = 3 \times 10^9$ st C
  ab C (electromagnetic unit of charge) $1C = \frac{1}{10}$ ab C

SPECIFIC PROPERTIES OF CHARGE:-

① According to Benjamin Franklin, charges are of two types positive and negative.

② Like charges repel and unlike charges attract. (Fundamental law of electrostatics)

③ Charge is always associated with mass.
i.e Charge cannot exist without mass whereas mass can exist without charge.

④ When a body is positively charged → lose electrons → mass decreases
When a body is negatively charged → gains electrons → mass increases

⑤ Charge is conserved :- The charge of an isolated system remains constant. That means, charge can neither be created nor be destroyed

⑥ Charge is quantised :- Total charge of a body is equal to the integral multiple of fundamental charge 'e'

i.e $Q = \pm ne$, n = an integer (1, 2, 3, ...)

★ Minimum possible charge = $\pm e = \pm 1.6 \times 10^{-19}$ C

⑦ Charge is invariant :- Charge is independent of frame of reference. That is, charge on a body doesnot change whatever may be its speed.

⑧ Charge is additive :- Total charge on an isolated system is equal to the algebraic sum of charges on individual bodies of the system
i.e If a system contain three charges, q_1, q_2 & q_3 then total charge on the system $Q = q_1 + q_2 + q_3$.

JM