

PHYSICS

KEY TERMS

ELECTROSTATICS

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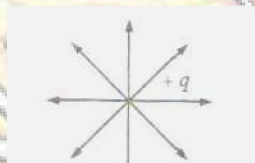
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1. **Electrostatics.** The branch of physics which deals with electric charges at rest is called electronics (i.e. static electricity).
2. **Electric charge.** Electric Charge is a physical quantity due to which electrical and other related effects are produced in the matter.
3. **Frictional electricity.** It is the electricity produced due to rubbing of two suitable materials.
4. **Electrostatic Induction.** It is the method of charging in which no physical contact is required between the charged and uncharged conducting bodies.
5. **Quantization of Electric Charge.** It is the property of an electric charge which states that any charged body will have an integral multiple of the basic charge on an electron 'e' i.e. 1.6×10^{-19} C.
6. **Additivity of Electric Charge.** Net charge on an extended body is the algebraic sum of all charges in the body.
7. **Conservation of Electric Charge.** The algebraic sum of positive and negative charges in an isolated system remains same.
8. **Coulomb's Law of Electrostatic Force (Scalar form of Coulomb's Law).** According to this law, the force between any two point charges, at relative rest, is directly proportional to the product of the magnitude of charges and inversely proportional to the square of the distance of separation between them.
9. **Relative permittivity (ϵ_r).** It is defined as the ratio of the Coulomb's force F between two point charges placed in free space to the Coulomb's force F' , between the same charges having same distance of separation when placed in a medium i.e. $\epsilon_r = F / F'$.
10. **Dielectric constant (K).** it is the ratio of the capacitance of a parallel plate capacitor with dielectric medium between plates to the capacitance C with air between the plates i.e. $K = C' / C$
11. **Coulomb.** One coulomb is that amount of charge which repels equal and charge of same type placed at a distance of a 1 m from it in free space with a force of 9×10^9 N.
12. **Principle of Superposition.** According to the principle of superposition, total force acting on a given charge due to number of charges around it is the vector sum of the individual forces acting on that charge due to all charges.

13. **Continuous distribution of charge.** A system of closely spaced electric charges at the macroscopic level is referred to as a continuous charge distribution.
14. **Electric field.** The space around a charge within which its electrical effect can be felt is called electric field.
15. **Electric field Intensity.** The electric field intensity at any point in an electric field is defined as the force experienced by a unit positive charge placed at that point.
16. **Electric Line.** Electric line is defined as the path of a unit positive charge when it is free to move in an electric field.
17. **Uniform field.** A field is uniform if its strength is same at every point in the given space. A uniform field is represented by straight, equispaced parallel field lines as shown below :



18. **Non-uniform field.** A field is non-uniform if its strength is different at different points in the given space.



Notes :- Field of an isolated charge is non-uniform. The field lines are radial and not parallel to one another.

19. **Electric Dipole.** A pair of two equal charges but of opposite sign and separated by some distance is called an electric dipole.
20. **Electric dipole moment.** Electric dipole moment of an electric dipole is given by the product of the magnitude of any one of the charges of the dipole and the dipole length.

Or

It is equal to the torque acting on the dipole if it is placed at 90° to a unit uniform electric field.

21. **Potential Energy of Dipole.** The work done in rotating the dipole from one positive to another is stored in the form of energy called potential energy of the dipole.

22. **Work done by Electric field.** Work done on a unit positive charge in moving it from one point to another in the electric field is given by the line integral of electric intensity.
23. **Electric Potential.** Electric potential of a body is a physical quantity which determines the flow of charge from that body to another body.
24. **Electric potential at a point in the electric field.** It is defined as the work done per unit charge in moving a unit positive test charge from infinity to that point against the electrostatic force of the field irrespective of the path followed.
25. **Electric Potential Difference** between any two points in an electric field is the negative line integral of electric field intensity between these points along any path.
26. **volt.** Potential at a point is one volt if one joule of work is done in moving one coulomb of charge from infinity to that point in the electric field.
27. **Principle of superposition of potentials.** The net potential at any point in the field of a group of charges is given by the algebraic sum of their individual potentials at that very point.
28. **Equipotential Surface.** A surface having same potential at every point due to charge distribution is called equipotential surface.
29. **Electrical Potential energy.** The work done on a charge in bringing it from infinity to point in an electric field against the electrical force is called electrical potential energy.
30. **Electric Flux.** Electric flux is defined as the total number of electronic lines of force passing through a surface.
31. **Gauss' Theorem in Electrostatics.** The total electric flux through any closed surface in free space is $1/\epsilon_0$ times the total electric charge enclosed by the surface.
- i.e.
$$\phi = \oint_S \vec{E} \cdot d\vec{S} = \frac{q}{\epsilon_0}$$
- where q is the total charge enclosed by the surface S and ϵ_0 is the permittivity of free space.
32. **Conductors.** The materials which easily allow the flow of electric charge through them are called conductors.

33. **Insulators.** The materials which do not allow the flow of electric charge through them are called insulators.
34. **Electrostatic Shielding.** The method of protection from the effect of electric field is called electrostatic shielding.
35. **Dielectrics.** The non-conducting materials in which charges are easily produced on the application of electric fields are called dielectrics e.g. Air, H₂ gas , glass, mica ,paraffin wax , transformer oil etc.
36. **Polarization** of a dielectric is the process of equal and opposite charges on the two opposite faces of the dielectric on the application of electric field.
37. **Dielectric Strength.** The maximum value of the electric field intensity that can be applied to the dielectric material without its electric break down is called the dielectric strength of that material.
38. **Electrical Capacitance.** The ability of a conductor to store charges is known as electrical capacitance or capacity of a conductor.
39. **farad.** It is the S.I. unit of capacitance. Capacitance is said to be 1 farad if 1 coulomb of charge is required to raise the potential through 1 volt.
40. **Capacitor.** A capacitor has two conductors separated by dielectric medium such that it can store large amount of electric charge in small space.
41. **Principle of a Parallel plate Capacitor.** Capacitance of a charged conductor is increased by bringing another uncharged or low potential near it while the two conductors remain separated with some dielectric medium between them.
42. **Principle of van de Graaff generator.**
- i. Charge remains on the outer surface of a spherical shell.
 - ii. Pointed surfaces have larger charge densities.

Note : if any mistake on this, kindly inform on the mail id :

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Your Observation! Our Correction !!