IIT/EKLAVYA BATCH

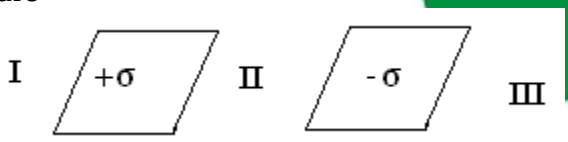
THE GURUKUL INSTITUTE

PLOT 5C, 2ND FLOOR, GANAPATI COMPLEX, SEC-13, OPP. JAIPURIA SCHOOL, VASUNDHARA, GHAZIABAD (U.P)PH. NO.9810780903

DAILY PRACTICE PROBLEMS

ELECTROSTATICS

1. How does the force between the two charges vary when
   a) The system is immersed in a medium.
   b) When the distance between them is halved?
2. How does the electric flux, electric field enclosing a given charge vary when the area enclosed by the charge is doubled?
3. Why in Millikan's Oil Drop experiment, the charge measured was always found to be of some discrete value and not any arbitrary value?
4. Two electric lines never cross each other. Why?
5. What is meant by electrostatic shielding?
6. Why an electric dipole placed in a uniform electric field does not undergoes acceleration?
7. Why electric field lines:
   a. Can never intersect one another?
   b. Cannot for closed loops sometimes?
   c. Cannot have break in between?
8. State Gauss's law and use this law to derive the electric filed at a point from an infinitely long straight uniformly charged wire.
9. Write the expression for the electric field, charge density for a uniformly charged thin spherical shell.
10. Write the expression for the electric field in the regions I, II, III shown in the given figure



11. The electric field in a certain region of space is $\vec{E}$= 104$\hat{\imath}$NC^{-1} . How much is the flux passing through an area 'A' if it is a part of XY plane, XZ plane, YZ plane, making an angle 30^0 with the axis?
12. Deduce Coulomb's law from Gauss' law.
13. Name the physical quantities whose SI units are Vm, Vm^{-1}. Which of these are vectors?
14. An electric dipole ±4μC is kept at co-ordinate points (1, 0, 4) are kept at (2,-1, 5), the electric field is given by $\vec{E}$= 20 $\hat{\imath}$NC^{-1}. Calculate the torque on the dipole.
15. Two charges 5μC, -3μC are separated by a distance of 40 cm in air. Find the location of a point on the line joining the two charges where the electric field is zero.
16. Show diagrammatically the configuration of stable and unstable equilibrium of an electric dipole ($\vec{p}$) placed in a uniform electric field ($\vec{E}$).

17. Show that at a point where the electric field intensity is zero, electric potential need not be zero.
18. Plot a graph showing the variation of Coulomb force F versus $1/r^2$ where r is the distance between the two charges of each pair of charges: (1μC, 2μC) and (2μC, -3μC) Interpret the graphs obtained.
19. A thin straight infinitely long conducting wire having charge density is enclosed by a cylindrical surface of radius r and length l, its axis coinciding with the length of the wire. Find the expression for electric flux through the surface of the cylinder
20. Calculate the force between two alpha particles kept at a distance of 0.02mm in air.
21. 21.A charge +Q fixed on the Y axis at a distance of 1m from the origin and another charge +2Q is fixed on the X axis at a distance of $\sqrt{2}$m from the origin. A third charge – Q is placed at the origin. What is the angle at which it moves?
22. Explain the role of earthing in house hold wiring.
23. What is the difference between induction and charging by friction?
    a. In frictional method, transfer of charges takes place from one object to the other.
    b. During induction, redistribution of charges takes place within the conductor
24. Two electric charges 3μC, -4μC are placed at the two corners of an isosceles right angled triangle of side 1 m as shown in the figure. What is the direction and magnitude of electric field at A due to the two charges?