Worksheet for Class XII
Module 3

Q1. What do you mean by electric lines of force? Give five important properties of electric lines of force.

Q2. Why do electric lines of force never cross each other?

Q3. Define the term electric flux. Write its SI unit.

Q4. How does the electric flux due to a point charge enclosed by a spherical Gaussian surface get affected when the radius of the spherical Gaussian surface is increased?

Q5. What is the electric flux due to an electric dipole which is enclosed in a cube of side l cm?

Q6. A point charge q is placed at the centre of a cube of side L. What is the electric flux passing through each face of the cube?

Q7. Draw a schematic diagram representing the electric lines of force due to a/an
(a) Isolated positive point charge
(b) Isolated negative point charge
(c) Similar charges of equal magnitude

Q8. Define electric dipole moment. Is electric dipole moment a scalar physical quantity?

Q9. Derive an expression for the electric field intensity at any point on the axial line of an electric dipole.

Q10. What is the SI unit of electric dipole moment?

Q11. Under what condition are the electric lines of force straight?

Q12. Under what condition are the electric lines of force curved/not straight?

Q13. On moving away from a point charge, the electric field intensify due to the point charge decreases. This is also true for a small electric dipole. Does the electric field intensity decrease at the same rate for both the cases?

Q14. A point charge is situated at a certain axial distance from an electric dipole due to which it experiences a force F. If the axial distance of the point charge is doubled, the force acting on the point charge will be

(a) $2F$ (b) $\frac{F}{2}$ (c) $\frac{F}{5}$ (d) $\frac{F}{8}$

Q15. Calculate the electric dipole moment between an electron and a proton which are present 4.3 x 10^{-9} m apart.

Q16. A system has two charges, $q_A = 2.5 \ x \ 10^{-7}$ C and $q_B = -2.5 \ x \ 10^{-7}$ C located at point A (0, 0, 15) cm and point B (0, 0, -15) cm respectively. Find the total electric charge and the electric dipole moment of the system.

Q17. Two electrons, separated by a distance of r m, experience an electrostatic force of F N. Two α particles, separated by a distance of $2r$ m, will experience an electrostatic force of

(a) $2F$ (b) $3F$ (c) $\frac{F}{2}$ (d) F

Q18. Two point charges repel each other with a force of 10^{-2} N when they are placed 40 cm apart. Calculate the force between the two point charges when they are placed 20 cm apart.

Q19. Calculate the ratio of the electrostatic force to the gravitational force between two electrons placed at a certain separation in air.

Q20. A force of 40 N is acting between two point charges placed at a certain separation in air. If the space between the two point charges is filled by glass having a dielectric costant of 8, what will be the new force experienced by the charges?