



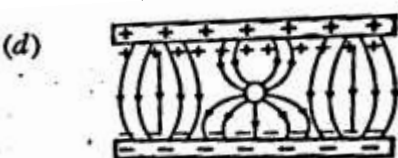
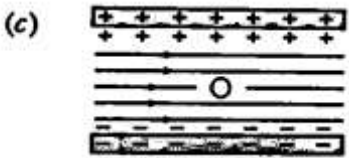
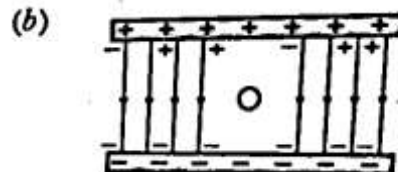
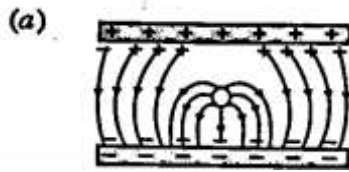
FUNDAMENTAL TUTORIAL Physics by Rajendra Prasad M.Sc. (Phy.) PU. for XIth, XIIth IIT-JEE & NEET

Time: 1.5 hr

SET-A (XII) ELECTRIC FIELD

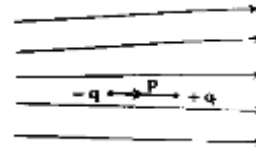
F.M: 25

1. Which of the diagrams correctly represents the electric field between two charged plates, if a neutral conductor is placed in between the plates?



2. Figure shows electric field lines in which an electric dipole p is placed as shown. Which of the following statements is correct?

- (a) the dipole will not experience any force.
(b) the dipole will experience a force towards right.
(c) the dipole will experience a force towards left.
(d) the dipole will experience a force upwards.



3. In an experiment three microscopic latex spheres are sprayed into a chamber and become charged with charges $+3e$, $+5e$, and $-3e$ respectively. All the three spheres came in contact simultaneously, for a moment and got separated. Which one of the following are possible values for the final charge on the spheres?

- (a) $+5e, -4e, +5e$ (b) $+6e, +6e, -7e$ (c) $-4e, +3.5e, +5.5e$ (d) $+5e, -8e, +7e$

4. Two point charges placed in a medium of dielectric constant 5 are at a distance r between them, experience an electrostatic force 'F'. The electrostatic force between them in vacuum at the same distance r will be-

- (a) $5F$ (b) F (c) $F/2$ (d) $F/5$

5. An electron experiences n force $(1.6 \times 10^{-16} \text{ N}) \hat{i}$ in an electric field \vec{E} . The electric field \vec{E} is-

- (a) $(1.0 \times 10^3 \text{ NC}^{-1}) \hat{i}$ (b) $-(1.0 \times 10^3 \text{ NC}^{-1}) \hat{i}$ (c) $(1.0 \times 10^{-3} \text{ NC}^{-1}) \hat{i}$ (d) $-(1.0 \times 10^{-3} \text{ NC}^{-1}) \hat{i}$

6. An electric dipole of length 2cm is placed at an angle of 30° with an electric field $2 \times 10^5 \text{ N/C}$. If the dipole experiences a torque of $8 \times 10^{-3} \text{ Nm}$, the magnitude of either charge of the dipole, is-

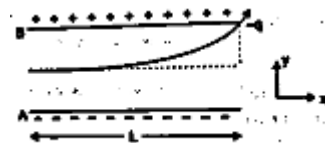
- (a) $4 \mu\text{C}$ (b) $7 \mu\text{C}$ (c) 8mC (d) 2mC

In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false and R is also false.

7. **Assertion (A)** : In a non-uniform electric field, a dipole will have translatory as well as rotatory motion.
Reason (R) : In a non-uniform electric field, a dipole experiences a force as well as torque.
8. **Assertion (A)** : Total flux through a closed surface is zero, if no charge is enclosed by the surface.
Reason (R) : Gauss law is true for any closed surface, no matter what its shape or size is.
9. (a) An electrostatic field line is a continuous curve. That is a field line cannot have sudden breaks. Why is it so?
 (b) Explain why two field lines never cross each other at any point?
10. Derive an expression for the torque acting on an electric dipole of dipole moment \vec{P} placed in a uniform electric field \vec{E} . Write the direction along which the torque acts.
11. (a) Define electric flux. Write its SI unit.
 (b) A spherical rubber balloon carries a charge that is uniformly distributed over its surface. As the balloon is blown up and increases in size, how does the total electric flux coming out of the surface change? Give reason.
12. A point charge $+10\mu\text{C}$ is at a distance 5 cm directly above the centre of a square of side 10 cm . What is the magnitude of the electric flux through the square?
13. A particle of mass m and charge $(-q)$ enters the region between the two charged plates initially moving along X -axis with speed v_x as shown in fig. The length of plate is L and an uniform electric field E is maintained between the plates. Show that the vertical deflection of the particle at the far edge of the plate is $\frac{qEL^2}{2mv_x^2}$.



14. Four point charges Q, q, Q and q are placed at the corners of a square of side ' a ' as shown in the figure. Find the resultant electric force on a charge Q .
15. Two point charges $q_1 = +1\mu\text{C}$ and $q_2 = +4\mu\text{C}$ are placed 2 m apart in air. At what distance from q_1 , along the line joining the two charges, will the net electric field be zero?
16. Use Gauss' law to obtain an expression for the electric field due to an infinitely long thin straight wire with uniform linear charge density λ .

PHYSICS By Rajendra Prasad M.Sc. (Phy.) P.U