

1 Mark Questions

1. Why do the electrostatic field lines not form closed loop? [All India 2014, Delhi 2012]

2. Why do the electric field lines never cross each other? [All India 2014]

3. Two point charges q_1 and q_2 are placed at a distance d apart as shown in the figure. The electric field intensity is zero at the point P on the line joining them as shown. Write two conclusions that you can draw from this. [Delhi 2014c]



4. Define dipole moment of an electric dipole. Is it a scalar quantity or a vector quantity? [Foreign 2012; All India 2011]

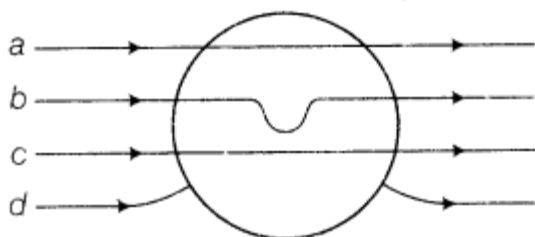
5. Draw a plot showing the variation of electric field (E) with distance r due to a point charge Q . [Delhi 2012]

6. A proton is placed in a uniform electric field directed along the positive X -axis. In which direction will it tend to move? [Delhi 2011 c]

7. In which orientation, a dipole placed in a uniform electric field is in (i) stable (ii) unstable equilibrium? [Delhi 2011; All India 2008]

8. Two point charges having equal charges separated by 1m distance experience a force of 8 N . What will be the force experienced by them if they are held in water at the same distance? (Given, $K_{\text{water}} = 80$). [All India 2010 C]

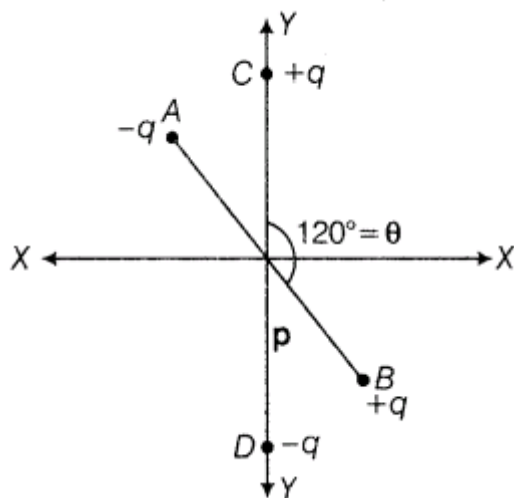
9. A metallic sphere is placed in a uniform electric field as shown in the figure. Which path is followed by electric field lines and why? [HOTS; Foreign 2010]



10. Point out right or wrong for the following statement. The mutual forces between two charges do not get affected by the presence of other charges.

11. A dipole of dipole moment p is present in a uniform electric field E . Write the value of the angle between p and E for which the torque experienced by the dipole, is minimum. [Delhi 2009 c]

12. Two small identical dipoles AB and CD, each of dipole moment p are kept at an angle of 120° as



2 Marks Questions

14. An electric dipole of length 4 cm when placed with its axis making an angle of 60° with a uniform electric field, experiences a torque of $4\sqrt{3}Nm$. Calculate the intensity of electric field if it has charge ± 8 nC. [Delhi 2014]

15. An electric dipole of length 2 cm when placed with its axis making an angle of 60° with a uniform electric field, experiences a torque of $8\sqrt{3}Nm$. Calculate the intensity of electric field if it has charge of ± 4 nC. [Delhi 2014]

16. Two point charges $4Q$ and Q are separated by 1 m in air. At what point on the line joining the charges, is the electric field intensity zero? [All India 2008]

17. Two identical metallic spherical shells A and B having charges $+4Q$ and $-10Q$ are kept a certain distance apart. A third identical uncharged sphere C is first placed in contact with sphere A and then with sphere B, then spheres A and B are brought in contact and then separated. Find the charge on the spheres A and B. [All India 2011 c]

18. Deduce the expression for the electric field E due to a system of two charges q_1 and q_2 with position vectors r_1 and r_2 at a point r with respect to common origin. [Delhi 2010c]

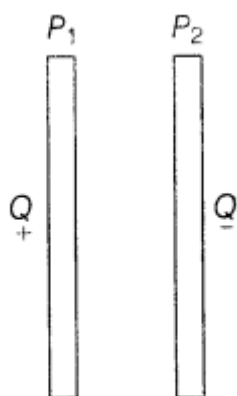
19. The sum of two point charges is 7 microC. They repel each other with a force of 1 N when kept 30 cm apart in free space. Calculate the value of each charge. [Foreign 2009] (Ans $2\mu C$, $5\mu C$)

20. Figure shows two large metal plates and P_2 tightly held against each other and placed between two equal and unlike point charges perpendicular to the line joining

them.

(i) What will happen to the plates when they are released?

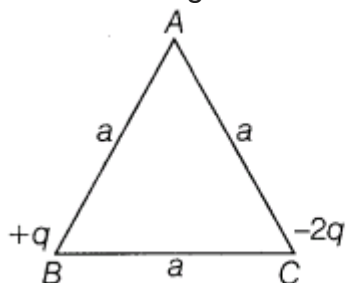
(ii) Draw the pattern of the electric field lines for the system. [HOTS; Foreign 2009]



21. Two charges $+Q$ and $-Q$ are kept at points $(-x_2, 0)$ and $(x_1, 0)$ respectively, in the XY-plane. Find the magnitude and direction of the net electric field at the origin $(0, 0)$. [All India 2009 C]

3 Marks Questions

22. Two point charges $+q$ and $-2q$ are placed at the vertices B and C of an equilateral triangle ABC of side a as given in the figure. Obtain the expression for (i) the magnitude and (ii) the direction of the resultant electric field at the vertex A due to these two charges.



[All India 2014 C]

23. Define the term electric dipole moment. Is it a scalar or vector? Deduce an expression for the electric field at a point on the equatorial plane of an electric dipole of length $2a$. [All India 2013; Foreign 2009]

24. Sketch the pattern of electric field lines due to
(i) a conducting sphere having negative charge on it.
(ii) an electric dipole. [All India 2011 C]

25. A positive point charge $(+q)$ is kept in the vicinity of an uncharged conducting plate. Sketch electric field lines originated from the point on to the surface of the plate. [All India 2009; HOTS]

4 Marks Questions

26. Deduce the expression for the torque acting on a dipole of dipole moment p in the presence of a uniform electric field E . [All India 2014; Delhi 2008]

27. An electric dipole moment p is held in a uniform electric field E .

(i) Prove that no translation force acts on the dipole.

(ii) Hence, prove that the torque acting on the dipole is given by $pE \sin \theta$ indicating the direction along which it acts. [Foreign 2008]