PHYSICS

BOOKS - BETTER CHOICE PUBLICATION

ELECTRIC FIELD

Very Short Answer Questions

1. Write a relation between electric field at a point and its distance from short dipole.

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2. Name the physical quantity whose S.I. unit is Newton Coulomb $\left(NC^{-1}\right)$.

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3. Name the physical quantity whose S.I. unit is volt/meter $\left(Vm^{-1}\right)$.

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4. Why two electric lines of force do not cross each other ?

5. Name the physical quantity represented by the expression $\vec{P} . \vec{E}$.

6. Define electric dipole moment.

7. When is the torque acting on an electric dipole maximum when placed in uniform electric field ?

8. What is an electric dipole ? What is its direction ?

1. An electron is placed in uniform electric field along positive X-axis. In which direction will it tend to move ?

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2. What is the direction of electric field at a point on the equitorial line of electric dipole ?

3. Does an electric dipole always experience a torque, when placed in a uniform electric field ?

4. In which orientation, a dipole placed in a uniform electric field is in stable equilibrium ?

5. Why do the clectrostatic field lines not form closed loops ?

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6. What is the net force on an electric dipole placed in a uniform electric field ?

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7. What is the importance of electric field intensity ?

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Short Answer Type Questions

1. Are the electric field lines a reality ?

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2. Give the important properties of electric field lines.

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3. Give important properties of electric lines of force.

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4. Derive an expression for torque experiencedby electric dipole in a uniform electric field

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5. What are electric lines of force ? What is its importance ?

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6. Electric field due to a point charge has spherical symmetry. Explain.

7. A charged particle is free to move in as electric field. Will it always move along an electric line of force?

Long Answer Type Questions

1. Derive an expression for electric field intensity at a distance r from a point charge q.

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2. Derive an expression for the electric potential at a point along the axial line of an electric dipole.

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3. Define electric fied intensity and derive an expression for it at a point on the neuttral axis of a dipole. Also determine its direction.

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4. What is the direction of electric field due to an electric dipole at a point on its axial line?

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5. Define electric fied intensity and derive an expression for it at a point on the neuttral axis of a dipole. Also determine its direction.

6. Derive an expression for the torque acting on an electric dipole suspended freely in a uniform electric field. How will you determine the direction of torque?

7. Which physical quantity has its SI unit(1) Cm

(2) N/C.

8. Two point charges q and -q is placed at a distance 2a apart.Calculate the electric field at a point P situated at a distance r along the perpendicular bisector of the line joining the charges. What is the electric field when

$r > > a$? Also, give the direction of electric field W.r.t. electric dipole moment? .

9. Two point charges q and-q are placed at a distance 2a part. Calculate the electric field at a point P situated at a distance r along the axial line of an electric dipole. What is the electric field when $r\rangle a$? Also, give the direction of elctric field w.r.t. electric dipole.

1. An electric dipoel consists of two equal and opposite charges placed 2 cm apart. When the dipole is placed in a uniform electric field of strength $10^5 NC^{-1}$, it experiences a maximum torque of $0.2 \times 10^{-3} Nm$. Find the magnitude of each charge.

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2. An electric dipoole, when placed at an angle $30°$ with a uniform electric field of $10^4 NC^{-1}$, expereinces a torque of 9×10^{-26}N m. Calculate the dipole moment and electrostatic potential energy in this position.

3. An electric dipole consists of two equal and opposite charges each of $1\mu C$ separated by 2 cm. When it is placed in uniform electric field

of $10^5 NC^{-1}$ at an angle θ with the electric field, it experiences a torque of 2×10^{-3} Nm. Find the value of angle θ.

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4. Two point charges of $-16\mu C$ and $+9\mu C$ are placed 8 cm apart in air. Determine the point at which resultant electric field is zero.

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5. Two points charges of $+20\mu C$ and $+80\mu C$ are plaed 18 cm apart. Find the position of the point where electric field is zero.

6. A distance of 2 m separates two point charges of $+5 \times 10^{-19} C$. Find the point on the line joining them at which electric field intensity is zero.

7. Find the time taken by a particle of mass 10^{-18} kg and carrying a charge 3.2×10^{-19} C to fall through a distance of 8 m in a uniform electric field of intensity $8 \times 10^2 NC^{-1}$

8. Find the time taken by a particle of mass $2 \times 10^{-18} kg$ and carrying a charge of $1.6 \times 10^{-19} C$ to fall through a distance of 4.0

m in a uniform electric field of intensity $1.6 \times 10^3 NC^{-1}$

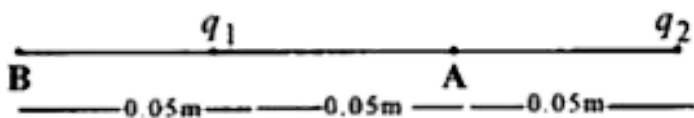**9.** Find the time taken by a particle of mass $4 \times 10^{-18} \text{kg}$ and carrying a charge $6.4 \times 10^{-19} C$ to fall through a distance of 2m in a uniform electric field of intensity $4 \times 10^2 NC^{-1}$.

10. Two charges $'q_1'$ and $'q_2'$ of magnitude $10^{-8}C$ and $-10^{-8}C$, respectively, are placed 0.1 m apart. Calculate the electric field at points A and B as shown in Fig.

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Numerical Problems Most Expected Questions

1. A charged plastic spherical ball of mass $8.4 \times 10^{-14} kg$ is found to remain suspended in a uniform electric field of Entensity $5 \times 10^2 NC^{-1}$. Calculate the charge on the ball.

2. Two charges $+10$ and $+40$ micro-coulomb are placed 12 cm apart in air. Find the position where electric field intensity is zero.

3. Two charges of $\pm 0.2\mu\mu C$ and $-0.2\mu\mu C$ are placed 10^{-6} cm apart. Calculate the electric field at an axial point at a distance of 10 cm from their mid point. Use the standard value of ε_0

4. A particle of mass $10^{-3}kg$ and charge $5\mu C$ is thrown at a speed $20ms^{-1}$ against a

uniform electric field of strength $2 \times 10^5 NC^{-1}$, How much distance will it travel before coming to rest momentarily?