BCM SCHOOL, BASANT AVENUE, DUGRI ROAD, LUDHIANA

ASSIGNMENT. CLASS XII PHYSICS

CHAPTER-ELECTRIC CHARGES AND FIELDS

DATE: April 24, 2024

MCQs:

1. An electric dipole is placed at an angle of 30° to a non-uniform electric field. The dipole will experience.
   (a) a torque as well as translational force.
   (b) a torque only.
   (c) a translational force only in the direction of the field.
   (d) a translational force only in a direction normal to direction of the field
2. An electric dipole has a fixed dipole moment $\vec{p}$, which makes angle θ with respect to x-axis. When subjected to an electric field $\overrightarrow{E_1}$ =E$\hat{i}$, it experiences a torque $\overrightarrow{T_1}$ =$\tau\,\hat{k}$. When subjected to another electric field $\overrightarrow{E_2}$= $\sqrt{3}E_1\,\hat{j}$, it experiences a torque $\overrightarrow{T_2}$ = $\overrightarrow{-T_1}$. The angle θ is
   (a) 30°
   (b) 45°
   (c) 60°
   (d) 90°
3. Two point charges +8q and -2q are located at x = 0 and x = L respectively. The location of a point on X-axis at which the net electric field due to these two point charges is zero is
   (a) 2L
   (b) $\frac{L}{4}$
   (c) 8L
   (d) 4L
4. Point charges +4q, -q and +4q are kept on the X-axis at points x = 0, x = a and x = 2a respectively.

(a) Only -q in stable equilibrium.

(b) None of the charges is in equilibrium.

(c) All the charges are in unstable equilibrium.

(d) All the charges are in stable equilibrium

5. A thin plastic rod is bent into a circular ring of radius R. It is uniformly charged with charge density λ. The magnitude of the electric field at its center is :

   (a) $\frac{\lambda}{2\varepsilon_0 R}$

   (b) ZERO

   (c) $\frac{\lambda}{4\pi\varepsilon_0 R}$

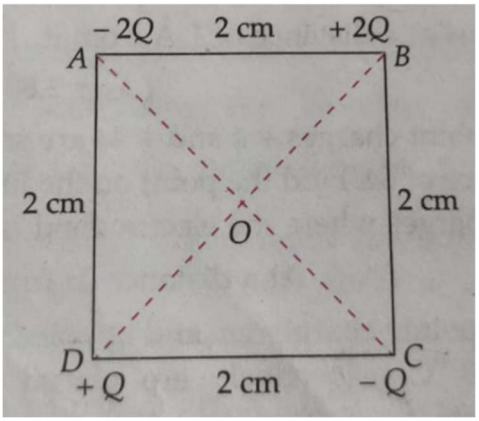
   (d) $\frac{\lambda}{4\varepsilon_0 R}$

6. Find the magnitude and direction of electric field intensity due to an electric dipole of length 2a at the mid-point of the line joining the two charges.

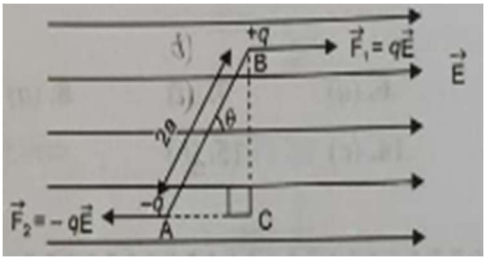
7. Define electric flux. Write its S.I. unit. A charge q is enclosed by a spherical surface of radius R. If the radius is reduced to half, how would the electric flux through the surface change

8. A particle of mass m and charge (-q) enters the region between the two charged plates initially moving along x- axis with speed vx The length of plate is L and a 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 $\frac{qEL^2}{2mv}$

9. four point charges at the corners of a square of side 2 cm. Find the magnitude and direction of the electric field at the centre O of the square,Q = 0.02 μC.



10. A pair of two equal and opposite charges separated by certain distance is called an electric dipole and the product of the magnitude of either charge of the electric dipole and the dipole length called electric dipole moment. When this electric dipole is placed in a uniform electric field, then it experience equal and opposite forces, which cancel each other, so net force acting on the electric dipole is zero. These forces acting on different points, so these produce torque on the dipole. There is no translatory motion of the electric dipole because the net force is zero inside the uniform electric field, however some work is done in rotating the dipole against the torque acting on it.



From the above passage, answer the following questions:

1. The correct relation between the electric field and electric dipole moment is:

(a) $\tau = pE\cos\theta$

(b) $\vec{\tau} = \vec{E}X\vec{p}$

(c)) $\vec{\tau} = \vec{p}X\vec{E}$

(d) $\vec{\tau} = \vec{p}.\vec{E}$

2. In hydrogen atom, the proton (e) and electron (-e) are separated by a distance 5.29 x $10^{-11}m$ The electric dipole moment of this atom is:

(a)$8.46X10^{-30}Cm$

(b) $4.23X10^{-15}Cm$

(c) $12.5X10^{-30}Cm$

(d) $8.46X10^{-18}Cm$

3. An electric dipole consists of two opposite charges each of magnitude 8 nC separated by 8.0 cm. The placed in an uniform electric field of is placed 5 x 10^5 N/C. The field exert maximum torque on the dipole is:

(a) 32 x 10-5 N/C

(b) 16 x 10-5 N/C

(c) 32×10^5 N/C

(d) 16×10^5 N/C