ELECTRIC CHARGES AND FIELDS

COMPETENCY BASED QUESTIONS

MCQ (1mark)

1. Two positive ions each carrying a charge q are separated by a distance d. If F is the force of repulsion between the ions , the number of electrons missing from each ion

(a) $\frac{4\pi\epsilon_0 F d^2}{e^2}$ (b) $\sqrt{\frac{4\pi\epsilon_0 F e^2}{d^2}}$ (c) $\sqrt{\frac{4\pi\epsilon_0 F d^2}{e^2}}$ (d) $\frac{4\pi\epsilon_0 F e^2}{d^2}$

2. The total electric flux emanating from an alpha particle is

(a) $2e/\varepsilon_0$ (b)e/ε_0 (c) $4e/\varepsilon_0$ (d) $e2/\varepsilon_0$

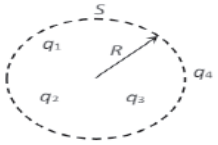
3. A charge Q is placed at each of the opposite corners of a sphere. A charge q is placed at each of the other corners .If the net electrical force on Q is zero then Q/q is equal to

(a) $-2\sqrt{2}$ (b) -1 (c) 1 (d) $-1/\sqrt{2}$

4. A cylinder of radius r and length l is placed in a uniform electric field parallel to the axis of the cylinder. The total flux for the surface of the cylinder is given by

(a) zero (b) πr^2 (c) $\pi E r^2$ (d) $2E(\pi r^2)$

5. q_1, q_2, q_3 and $q_4$are point charges located at points as shown in the figure and S is a spherical Gaussian surface of radius R. Which of the following is true according to the Gauss's law



(a) $\oint_S(\vec{E}_1+\vec{E}_2+\vec{E}_3).d\vec{s}=\frac{q_1+q_2+q_3}{2\varepsilon_0}$

(b) $\oint_S(\vec{E}_1+\vec{E}_2+\vec{E}_3).d\vec{s}=\frac{(q_1+q_2+q_3)}{\varepsilon_0}$

(c) $\oint_S(\vec{E}_1+\vec{E}_2+\vec{E}_3).d\vec{s}=\frac{(q_1+q_2+q_3+q_4)}{\varepsilon_0}$

(d) None of the above

6. Seven charges of equal magnitude q are placed at the corners of a cube of side b. The force experienced by another charge Q placed at the center of the cube is

(a) Zero (b) KQq/ 3b (c) 7KQq/3b (d) 2KQq/3b

7. Electric charge is uniformly distributed along a long straight wire of radius 1mm. The charge per cm of the wire is Q coulomb. Another cylindrical surface of length L meter encloses the wire symmetrically, The total flux through the surface is

(a) Q/ε_0 (b) LQ/ε_0 (c) $QL/10^{-3}\varepsilon_0$ (d) $Q/L\ 10^{-3}\varepsilon_0$

8 A hemisphere is uniformly charged positively. The electric field at a point on the diameter away from the centre is directed

(a) perpendicular to the diameter (b) parallel to the diameter.

(c) at an angle tilted towards the diameter (d) zero

ANSWERS

1.(a) 2. (a) 3. (a) 4. (a) 5.(b) 6. (d) 7. (b) 8. (a)