PHYSICS CLASSES BY NAYAN JHA

Test class 12^{th}

1.Two small identical sphere having charges +10μC attract each other with a force of F newton. If they are kept in contact and then separated by the same distance, the new force between them is: (a) F/6 (b) 16F (c) 16F/9 (d) 9F

2.An electric dipole is placed in a non-uniform electric field. Then net:

(a) force experienced is zero while torque is not zero
(b) force experienced is zero and torque is also zero
(c) both force and torque are not zero
(d) force experienced is not zero while torque is zero

3.Electric charges q , q, -2q are placed at the corners of an equilateral triangle ABC of side l. The magnitude of electric dipole moment of the system is:

(a) ql (b) 2ql (c) √3ql (d) 4ql

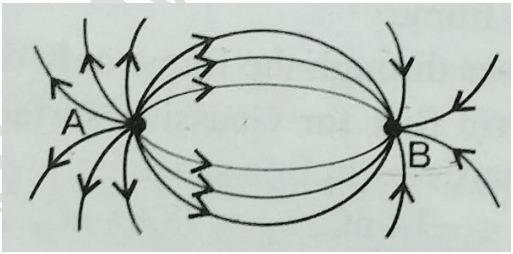
4.Eight dipoles of charges of magnitude e are placed inside a cube. The total electric flux coming out of the cube will be: (a) $8e/\varepsilon_0$ (b) $16e/\varepsilon_0$ (c) e/ε_0 (d) zero

5.The ratio of electric fields on the axis and at equator of an electric dipole will be:

(a) 1 : 1 (b) 2 : 1 (c) 4 : 1 (d) 1 : 4

6.Two point charges exert on each other a force F when they are placed r distance apart in air. When they are placed R distance apart in a medium of dielectric constant K, they exert the same force. The distance R equals: (a)r/√K (b) r/K (c) rK (d) r√K

7.The spatial distribution of the electric field due to two charges (A and B) is shown in figure. Which one of the following statements is correct?



(a) A is + ve and B is – ve and $|A| > |B|$
(b) A is - ve and B is + ve and $|A| = |B|$
(c) Both are + ve but A > B.
(d) Both are - ve but A > B.

8.An infinitely long thin straight wire has uniform linear charge density of $1/3cm^{-1}$. Then, the magnitude of the electric intensity at a point 18 cm away is:

(a) $0.33 \times 10^{11}\ NC^{-1}$ (b) $3 \times 10^{11}\ NC^{-1}$ (c) $0.66 \times 10^{11}\ NC^{-1}$ (d) $1.32 \times 10^{11}\ NC^{-1}$

9. A dipole of electric dipole moment p is placed in a uniform electric field of strength E. If Θ is the angle between positive directions of p and E, then the potential energy of the electric dipole is largest when Θ is: (a) π/4 (b) π/2 (c) π (d) zero

10. The radii of two sphere are a and b respectively. They are at equal electric potential. The ratio of their surface density of charge is: (a) a^2/b^2 (b) b/a (c) a/b (d) b^2/a^2

11.Assertion – the dielectric constant for metal is infinity.
Reason- when charged capacitor is filled completely with a metallic slab, its capacity becomes very large…

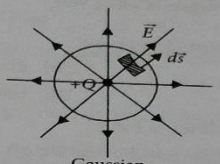
12.Assertion- charging is due to transfer of electron.

Reason- mass of body decreases slightly when it is negatively charged.

13. This question is case study based question , read the paragraph give carefully and answer the following question.

Guass's Law and Its Significance

Gauss's law and Coulomb's law, although expressed in different forms, are equivalent ways of describing the relation between charge and electric field in static conditions. Gauss's law is $\varepsilon_0\phi = q_{encl}$, when q_{encl} is the net charge inside an imaginary closed surface called Gaussian surface. $\phi = \oint \vec{E} \cdot d\vec{A}$ gives the electric flux through the Gaussian surface. The two equations hold only when the net charge is in vacuum or air.



Gaussian spherical surfaces

(i) If there is only one type of charge in the universe, then ($\vec{E}$ → Electric field, $d\vec{s}$ → Area vector)

(a) $\oint \vec{E} \cdot d\vec{s} \neq 0$ on any surface

(b) $\oint \vec{E} \cdot d\vec{s}$ could not be defined

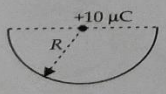
(c) $\oint \vec{E} \cdot d\vec{s} = \infty$ if charge is inside

(d) $\oint \vec{E} \cdot d\vec{s} = 0$ if charge is outside, $\oint \vec{E} \cdot d\vec{s} = \frac{q}{\varepsilon_0}$ if charge is inside

(ii) What is the nature of Gaussian surface involved in Gauss law of electrostatic ?

(a) Magnetic (b) Scalar (c) Vector (d) Electrical

(iii) A charge 10 μC is placed at the centre of a hemisphere of radius R = 10 cm as shown. The electric flux through the hemisphere (in MKS units) is



(a) 20×10^5 (b) 10×10^5 (c) 6×10^5 (d) 2×10^5

(iv) The electric flux through a closed surface area S enclosing charge Q is ϕ. If the surface area is doubled, ther the flux is

(a) 2ϕ (b) $\phi/2$ (c) $\phi/4$ (d) ϕ

(v) A Gaussian surface encloses a dipole. The electric flux through this surface is

(a) $\frac{q}{\varepsilon_0}$ (b) $\frac{2q}{\varepsilon_0}$ (c) $\frac{q}{2\varepsilon_0}$ (d) zero