

Test class 12th (electrostatics)

1 .. 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) $\pi/4$ (b) $\pi/2$ (c) π (d) zero
(e) $2/3\pi$

2. If $q_1 + q_2 = q$, then the value of the ratio q_1/q_2 for which the force between q_1 and q_2 is maximum is:

- (a) 0.25 (b) 0.75 (c) 1 (d) 0.5 (e) 1.5

3. The potential of a large liquid drop when eight liquid drop are combined is 20 V. Then, the potential of each single drop was: (a) 10 V (b) 7.5 V
(c) 5 V (d) 2.5 V

4. Two conduction spheres of radii r_1 and r_2 have equal surface charge density. The ratio of their charges is:

- (a) (r_1^2/r_2^2) (b) (r_2^2/r_1^2) (c) (r_1/r_2) (d) (r_2/r_1)

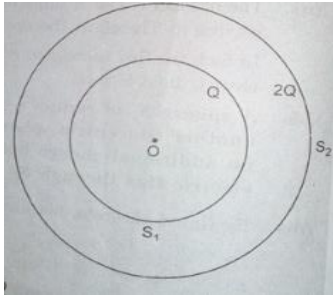
3. Electric field intensity at a point in between two parallel sheets with like charges of same surface charge densities (σ) is ; (a) zero (b) σ/ϵ_0
(c) $\sigma/2\epsilon_0$ (d) $2\sigma/\epsilon_0$

5.. A charged q is located at the centre of a cube the electric flux through any face is:

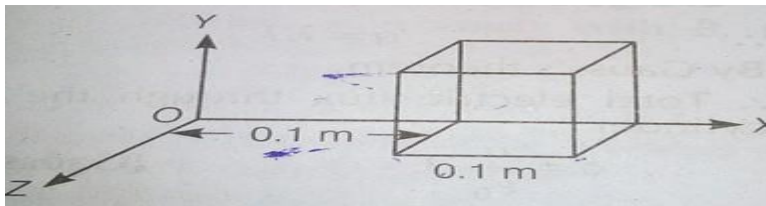
- (a) $4\pi q/6(4\pi\epsilon_0)$ (b) $\pi q/6(4\pi\epsilon_0)$ (c) $q/6(4\pi\epsilon_0)$ (d) $2\pi q/6(4\pi\epsilon_0)$

6. State Gauss's law . Using this law derive an expression for the electric field due to a (1) uniformly charged infinite charged plane sheet, (2) charged spherical shell, (3) infinite long charged wire of linear charge density λ .

7. S_1 and S_2 are two hollow concentric spheres enclosing charges Q and $2Q$ respectively as shown in fig. (1) what is the ratio of electric flux through S_1 and S_2 . (2) How will the electric flux through S_1 changes if a medium of dielectric constant ϵ is introduced in the space inside S_1 in place of air.

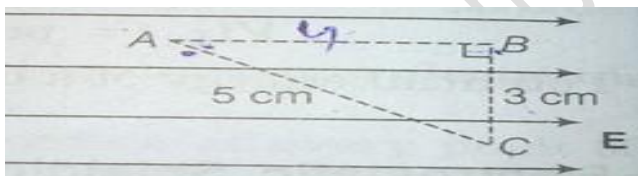


8.(1) Define electric flux, write its SI unit. (2) The electric field components due to a charge inside the cube of side 0.1 m are shown below $E_x = \alpha x$, where $\alpha = 500 \text{ N/C-m}$, $E_y = 0, E_z = 0$



Calculate (a) The flux through the cube (b) the charge inside the cube

9. A test charge q is moved without acceleration from A to B and then from B to C along the path from A to B and then from B to C in electric field E as shown in fig. (i) calculate the potential difference between A and C. (ii) at which point is the electric potential more and why?



10. A tiny particle of mass $10 \mu\text{g}$ is kept over a large horizontal sheet of charge density $4 \times 10^{-6} \text{ C/m}$. What charge should be given to the particle so that if released it doesn't fall down?

11. An electric dipole of length 10 cm having charges $6 \times 10^{-3} \text{ C}$, placed at 30° with respect to uniform electric field, experience a torque of magnitude $6\sqrt{3} \text{ Nm}$. Calculate (i) electric field and (ii) potential energy of electric dipole

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