SARALA BIRLA PUBLIC SCHOOL

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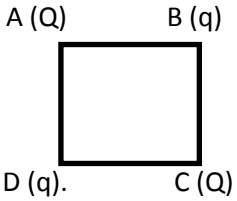
(SARALA BIRLA GROUP OF SCHOOLS)

Birla Knowledge City, Mahilong, Ranchi
CLASS-XII (2020-21)

INTERNATIONAL SCHOOL AWARD 2018-21

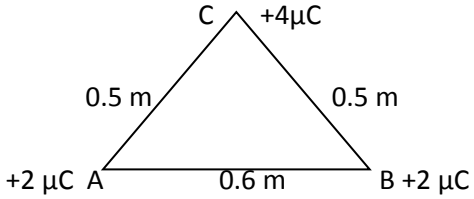
Sub: Physics
Assignment-2

1. A charge q is placed at the centre of a cube of side l. What is the electric flux passing through two opposite faces of the cube?
2. A proton is placed in a uniform electric field directed along positive X – Axis. In which direction will it tend to move ?
3. An electric dipole is held in a uniform electric field.
   (i) Show that the net force acting on it is zero.
   (ii) The dipole is aligned parallel to the field. Find the work done in rotating it through the angle of 180°
4. Plot a graph showing the variation of coulomb force (F) versus $(1/r^2)$, where r is the distance between the two charges of each pair of charges: (1 μC, 2 μC) and (2 μC, - 3 μC). Interpret the graph obtained.
5. Four point charges Q, q, Q and q are placed at the corners of a square of side 'a'. Find the resultant electric force acting on a charge Q.



6. (i) Two point charges 4Q and Q are separated by a distance 1 m in air. At what point on the line joining the charges is the electric field intensity zero?
   (ii)Also calculate the electrostatic potential energy of the charge if Q = 2 x 10^{-7} C.

7. Derive the expression for electric field at a point on the equatorial line of an electric dipole.
8. In the following figure, three charges of +2 μC, +2 μC and + 4 μC are placed at vertices A, B and C of an isosceles triangle where AC = BC = 0.5 m and AB = 0.6 m. Calculate the net electrostatic force acting on +4 μC charge placed at C.



9. Derive the expression for the work done in rotating an electric dipole from angle θ_1 to θ_2 in a uniform electric field (E). Hence find the work done when the dipole is
   (a) initially parallel to the field and
   (b) initially perpendicular to the field.

10. (a) State Gauss' law. Use it to deduce an expression for the electric field due to a uniformly charged thin spherical shell at points (i) inside, and (ii) outside the shell.

    Plot a graph showing variation of electric field as a function of r, when $r < R$ and $r > R$, (r being the distance from the centre of the shell).

or

(a) Define electric flux. Write its S.I. unit.

(b) Using Gauss' law, prove that the electric field at a point due to a uniformly charged infinite plane sheet is independent of the distance from it.

(c) How is the field directed if (i) the sheet is positively charged, and (ii) negatively charged?