

## BRAIN INTERNATIONAL SCHOOL

### PHYSICS ASSIGNMENT

### CLASS 12

Apr-May 18

- 1) State coulombs law in electrostatics . explain the same in SI units.
- 2) Two point charges  $+4e$  and  $+e$  are fixed 'a' distance apart. Where should a third charge  $q$  be placed on the line joining the two charges so that it may be in equilibrium.
- 3) Three charges  $q$ ,  $q$ ,  $-q$  are placed at the three vertices A, B, C respectively of a triangle . What is the force on each charge .
- 4) An electron moves a distance of 6 cm when accelerated from rest by an electric field of strength  $2 \times 10^4$  N/C. Calculate the time of travel.
- 5) Calculate the magnitude of electric field which can just balance a deuteron of mass  $3.2 \times 10^{-27}$  kg. Take  $g = 10 \text{ m/sec}$ .
- 6) Obtain the formula for the electric field due to a long thin wire of uniform linear charge density without using Gauss law.
- 7) Two point charges of  $+16 \mu\text{C}$  and  $-9 \mu\text{C}$  are placed 8 cm apart in air. Determine the position of the point at which the resultant field is zero.
- 8) Determine the electric field produced by a helium nucleus at a distance of  $1 \text{ \AA}$  from it.
- 9) Derive expression for the electric field at any point on the equatorial line of an electric dipole.
- 10) Define electric flux. Also state and prove Gauss law.
- 11) A circular plane sheet of radius 10 cm is placed in a uniform electric field of  $5 \times 10^5$  N/C, making an angle of 60 degree with the field . Calculate electric flux through the sheet.
- 12) Apply Gauss law to show that for a spherical shell, the electric field inside the shell vanishes whereas outside it ,the field is as if all the charges had been concentrated at the centre.
- 13) A Charge Of  $17.7 \times 10^{-4}$  C is distributed uniformly over a large sheet of area  $200 \text{ m}^2$  . Calculate the electric field at a distance of 20 cm from it in air.
- 14) Derive the relation that electric field at any point is equal to the negative of the potential gradient at that point.
- 15) Derive an expression for the potential energy of a dipole in a uniform electric field. Also discuss the condition of stable and unstable equilibrium.
- 16) Determine the electrostatic potential energy of a system consisting of two charges  $7 \mu\text{C}$  and  $-2 \mu\text{C}$  at  $(-9\text{cm}, 0, 0)$  and  $(9\text{cm}, 0, 0)$  respectively.
- 17) In the above question how much work is required to separate the two charges infinitely away from each other .
- 18) Derive expression for the capacitance of a parallel plate capacitor when a dielectrics of thickness  $t$  is inserted between them.
- 19) Derive expression for the electric field due to a charge distributed in a ring of radius  $r$ .
- 20) Find the value of loss of energy when two capacitors are connected by a wire .