DATE: MARKS: 180

ELECTROSTATICS

LEVEL - I

1. Two charges of $40\mu C$ and $-20\mu C$ are placed at a certain distance apart. They are touched and kept at the same distance. The ratio of the initial to the final force between them is
a) 8 : 1 b) 4 : 1
c) 1 : 8 d) 1 : 1

2. Two charges q_1 & q_2 are kept at a certain distance in air. If a dielectric (glass slab) is introduced between them, the force between the charges will
a) increase
b) remain unchanged
c) be doubled
d) decrease

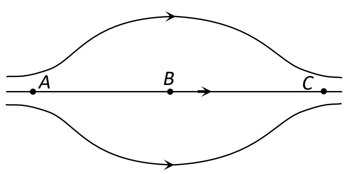
3. A point charge Q is placed at the centre of a circular wire of radius R having charge q. The force of electrostatic interaction between point charge and the wire is:
a) $\frac{qQ}{4\pi\varepsilon_0 R^2}$ b) $\frac{q^2}{4\pi\varepsilon_0 R}$
c) zero d) none of these

4. Equal charges *Q* are placed at the vertices *A* and *B* of an equilateral triangle *ABC* of side *a*. The magnitude of electric field at the point *A* is
a) $\frac{Q}{2\pi\varepsilon_0 a^2}$ b) $\frac{\sqrt{2}Q}{4\pi\varepsilon_0 a^2}$
c) $\frac{\sqrt{3}Q}{4\pi\varepsilon_0 a^2}$ d) $\frac{Q}{4\pi\varepsilon_0 a^2}$

5. The electric field required to keep a water drop of mass 'm' just to remain suspended, when charged with one electron, is
a) mg b) $\frac{em}{g}$
c) emg d) $\frac{mg}{e}$

6. A charge (–*q*) and another charge (+*Q*) are kept at two points *A* and *B* respectively. Keeping the charge (+*Q*) fixed at *B*, the charge (–*q*) at *A* is moved to another point *C* such that *ABC* forms an equilateral triangle of side *l*. The network done in moving the charge (–*q*) is
   a) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{l}$ b) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{l^2}$
   c) $\frac{1}{4\pi\varepsilon_0}Qql$ d) Zero

7. The figure shows some of the electric field lines corresponding to an electric field. The figure suggests
   a) $E_A > E_B > E_C$
   b) $E_A = E_B = E_C$
   c) $E_A = E_C > E_B$
   d) $E_A = E_C < E_B$



8. Electric lines of force about negative point charge are
   a) Circular, anticlockwise
   b) Radial, inward
   c) Circular, clockwise
   d) Radial, outward

9. Dimensions of electric flux are:
   a) $[M^1 L^1 T^{-3} I^{-1}]$ b) $[M^1 L^3 T^{-1} I^{-1}]$
   c) $[M^1 L^1 T^{-1} I^{-1}]$ d) $[M^1 L^3 T^{-3} I^{-1}]$

10. The statement of Gauss' theorem is. The total _____ over a closed surface of any shape drawn in an electric field is equal to 1/ ε times the algebraic sum of the charges enclosed by the surface:
    a) T.N.E.I.
    b) electric induction
    c) electric flux.
    d) none of the above.

11. Surface charge density of a metal sphere of radius *R* is *σ*. Intensity of the electric field at a distance *2R* from the surface of the sphere is:
    a) $\frac{\sigma}{4\varepsilon}$ b) $\frac{\sigma}{3\varepsilon}$
    c) $\frac{\sigma}{2\varepsilon}$ d) $\frac{\sigma}{9\varepsilon}$

12. The dimensional equation of capacity is:
    a) $[M^{-1} L^{-2} T^4 I^2]$ b) $[M^2 L^1 T^2]$
    c) $[M^1 L^2 T^3 I^{-2}]$ d) $[M^{-1} L^{-1} T^5 I^1]$

13. Two condensers of capacity X and Y are connected in parallel. If charge Q is given to the assembly, the charge gets shared. Ratio of charge on X to that on Y is:
    a) Y/X b) XY
    c) X/Y d) 1 / XY.

14. Two capacitors of capacity C_1 and C_2 are connected in series and potential difference V is applied across it. The potential difference across C_1 will be:
    a) $V \times (C_2/C_1)$
    b) $[V \times (C_1 + C_2)]/C_1$
    c) $(V \times C_2)/(C_1 + C_2)$
    d) $(V \times C_1)/(C_1 + C_2)$

15. What fraction of the energy drawn from the charging battery is stored in the capacitor?
    a) 100% b) 75%
    c) 50% d) 25%

16. A parallel plate air capacitor has capacity ‘C’ farad, potential ‘V’ volt and energy ‘E’ joule. When the gap between the plates is completely filled with dielectric
    a) both V and E increase
    b) both V and E decrease
    c) V decreases, E increases
    d) V increases, E decrease