PRERNA EDUCATION
IIT-JEE | NEET | BOARDS | NTSE | KVPY | OLYMPIADS

Chapter 1 Electric Charges and Fields

Assignment 4

Class 12

PRERNA EDUCATION

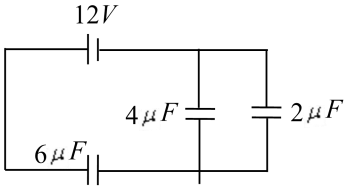
DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Subject : PHYSICS**
Date : **DPP No. : 4**

Topic :-Electric charges and fields

1. Conduction electrons are almost uniformly distributed within a conducting plate. When placed in an electrostatic field $\vec{E}$, the electric field within the plate
   a) Is zero
   b) Depends upon E
   c) Depends upon $\vec{E}$
   d) Depends upon the atomic number of the conducting element

2. The charge deposited on $4\mu F$ capacitor in the circuit is



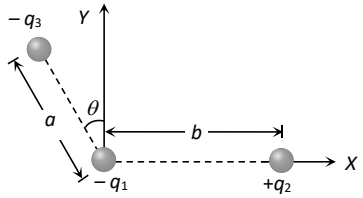
   a) $6 \times 10^{-6} C$ b) $12 \times 10^{-6} C$ c) $24 \times 10^{-6} C$ d) $36 \times 10^{-6} C$

3. The magnitude of electric field intensity E is such that, an electron placed in it would experience an electrical force equal to its weight is given by

   a) mge b) $\frac{mg}{e}$ c) $\frac{e}{mg}$ d) $\frac{e^2}{m^2}g$

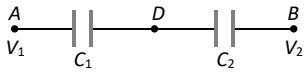
4. While a capacitor remains connected to a battery and dielectric slab is applied between the plates, then
   a) Potential difference between the plates is changed
   b) Charge flows from the battery to the capacitor
   c) Electric field between the plates increases
   d) Energy store in the capacitor decreases

5. Three charges $-q_1, +q_2$ and $-q_3$ are placed as shown in the figure. The x-component of the force on $-q_1$ is proportional to



a) $\frac{q_2}{b^2}-\frac{q_3}{a^2}\sin\theta$ b) $\frac{q_2}{b^2}-\frac{q_3}{a^2}\cos\theta$ c) $\frac{q_2}{b^2}+\frac{q_3}{a^2}\sin\theta$ d) $\frac{q_2}{b^2}+\frac{q_3}{a^2}\cos\theta$

6. Two condensers C_1 and C_2 in a circuit are joined as shown in figure. The potential of point A is V_1 and that of B is V_2. The potentials of point D will be

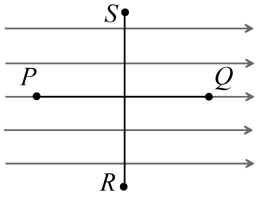


a) $\frac{1}{2}(V_1+V_2)$ b) $\frac{C_2V_1+C_1V_2}{C_1+C_2}$ c) $\frac{C_1V_1+C_2V_2}{C_1+C_2}$ d) $\frac{C_2V_1-C_1V_2}{C_1+C_2}$

7. A parallel plate air capacitor has a capacitance of $100\mu\mu F$. The plates are at a distance d apart. If a slab of thickness $t(t \le d)$ and dielectric constant 5 is introduced between the parallel plates, then the capacitance will be

a) $50\ \mu\mu F$ b) $100\ \mu\mu F$ c) $200\ \mu\mu F$ d) $500\ \mu\mu F$

8. The points resembling equal potentials are



a) P and Q b) S and Q c) S and R d) P and R

9. What is angle between electric field and equipotential surface?

a) 90°always b) 0° always c) 0° to 90° d) 0° to 180°

10. Two equal charges q are placed at a distance of $2a$ and a third charge $-2q$ is placed at the midpoint. The potential energy of the system is

a) $\frac{q^2}{8\pi\varepsilon_0 a}$ b) $\frac{6q^2}{8\pi\varepsilon_0 a}$ c) $-\frac{7q^2}{8\pi\varepsilon_0 a}$ d) $\frac{9q^2}{8\pi\varepsilon_0 a}$

11. An electric dipole is put in north-south direction in a sphere filled with water. Which statement is correct

a) Electric flux is coming towards sphere

b) Electric flux is coming out of sphere

c) Electric flux entering into sphere and leaving the sphere are same

d) Water does not permit electric flux to enter into sphere

12. If 3 charges are placed at the vertices of equilateral triangle of charge 'q' each. What is the net potential energy, if the side of equilateral Δ is $l\ cm$

a) $\frac{1}{4\pi\varepsilon_0}\frac{q^2}{l}$ b) $\frac{1}{4\pi\varepsilon_0}\frac{2q^2}{l}$ c) $\frac{1}{4\pi\varepsilon_0}\frac{3q^2}{l}$ d) $\frac{1}{4\pi\varepsilon_0}\frac{4q^2}{l}$

13. An electric dipole of moment p is placed at the origin along the x-axis. The electric field at a point P, whose position vector makes an angle θ with the x-axis, will make an angle .... With the x-axis, where $\tan\theta = \frac{1}{2}\tan\theta$

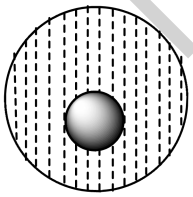
a) α b) θ c) $\theta + \alpha$ d) $\theta + 2\alpha$

14. A long, hollow conducting cylinder is kept coaxially inside another long, hollow conducting cylinder of larger radius. Both the cylinders are initially electrically neutral.
    a) A potential difference appears between the two cylinders when a charge density is given to the inner cylinder
    b) A potential difference appears between the two cylinders when a charge density is given to the outer cylinder
    c) No potential difference appears between the two cylinders when a uniform line charge is kept along the axis of the cylinders
    d) No potential difference appears between the two cylinders when same charge density is given to both the cylinders

15. The bob of simple pendulum is hanging vertically down from a fixed identical bob by means of string of length l. If both bobs are charged with a charge with a charge q each, time period of the pendulum is (ignore the radii of the bobs)

a) $2\pi\sqrt{\frac{l}{g+\left(\frac{q^2}{l^2m}\right)}}$ b) $2\pi\sqrt{\frac{l}{g-\left(\frac{q^2}{l^2m}\right)}}$ c) $2\pi\sqrt{\frac{l}{g}}$ d) $2\pi\sqrt{\frac{l}{g-\left(\frac{q2}{l}\right)}}$

16. A spherical portion has been removed from a solid sphere having a charge distributed uniformly in its volume as shown in the figure. The electric field inside the emptied space is

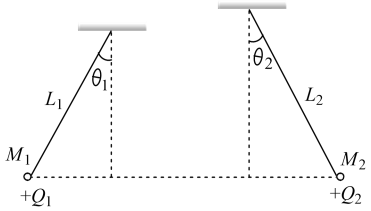


a) Zero everywhere
b) Non-zero and uniform
c) Non-uniform
d) Zero only at its centre

17. Four metal conductors having different shapes
    I. A sphere
    II. Cylinder
    III. Pear
    IV. Lightning conductor
    are mounted on insulating stands and charged. The one which is best suited to retain the charges for a longer time is
    a) 1 b) 2 c) 3 d) 4

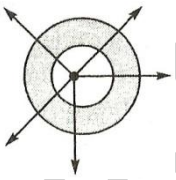
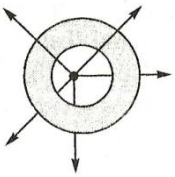
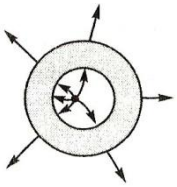
18. Two identical charges repel each other with a force equal to 10 mg wt when they are 0.6 m apart in air ($g = 10 ms^{-2}$). The value of each charge is
    a) 2mC b) 2×10^{-7} C c) 2 nC d) 2μ C

19. Two small spheres of masses M_1 and M_2 are suspended by weightless insulating threads of lengths L_1 and L_2. The spheres carry charges Q_1 and Q_2 respectively. The spheres are suspended such that they are in level with one another and the threads are inclined to the vertical at angles of θ_1 and θ_2 as shown. Which one of the following conditions is essential, if $\theta_1 = \theta_2$



    a) $M_1 \neq M_2$ but $Q_1 = Q_2$ b) $M_1 = M_2$ c) $Q_1 = Q_2$ d) $L_1 = L_2$

20. A metallic shell has a point charge q kept inside its cavity. Which one of the following diagrams correctly represents the electric lines or forces?

    a)  b)  c)  d)