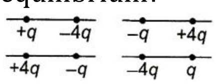
# DPP
DAILY PRACTICE PROBLEMS

**Class : XIIth** **Subject : PHYSICS**
**Date :** **DPP No. : 9**

## Topic :-Electric charges and fields

1. For a dipole $q = 2 \times 10^{-6} C$ and $d = 0.01\ m$. Calculate the maximum torque for this dipole if $E = 5 \times 10^{5}\ N/C$
   a) $1 \times 10^{-3} Nm^{-1}$ b) $10 \times 10^{-3} Nm^{-1}$ c) $10 \times 10^{-3} Nm$ d) $1 \times 10^{2} Nm^{2}$

2. The figure shows four situations in which charges as indicated $(q > 0)$ are fixed on an axis .In which situation is there a point to the left of the charges where an electron would be in equilibrium?


   a) 1 and 2 b) 2 and 4 c) 3 and 4 d) 1 and 3

3. If the electric field given by $(5\hat{\mathbf{i}} + 4\hat{\mathbf{j}} + 9\hat{\mathbf{k}})$, the electric flux through a surface of area 20 unit lying in the $Y$-$Z$ plane will be
   a) 100 unit b) 80unit c) 180 unit d) 20 unit

4. The electric potential at a point $(x,y)$ in the $x - y$ plane is given by $V = -kxy$. The field intensity at a distance $r$ from the origin varies as
   a) $r^2$ b) $r$ c) $\frac{1}{r}$ d) $\frac{1}{r^2}$

5. An electron falls through a small distance in a uniform electric field of magnitude $2 \times 10^{4} NC^{-1}$. The direction of the field is reversed keeping the magnitude unchanged and a proton falls through the same distance. The time of fall will be
   a) Same in both cases b) More in the case of an electron
   c) More in the case of proton d) Independent of charge

6. An electron of mass $m_e$ initially at rest moves through a certain distance in a uniform electric field in time $t_1$. A proton of mass $m_p$ also initially at rest takes time $t_2$ to move through and equal distance in this uniform electric field. Neglecting the effect of gravity, the ratio of $t_2/t_1$ is nearly equal to
   a) 1 b) $(m_p/m_e)^{1/2}$ c) $(m_e/m_p)^{1/2}$ d) 1836

7. Two unlike charges of the same magnitude $Q$ are placed at a distance $d$. The intensity of the electric field at the middle point in the line joining the two charges.

a) Zero
b) $\frac{3Q}{4\pi\varepsilon_0 d^2}$
c) $\frac{6Q}{2\pi\varepsilon_0 d^2}$
d) $\frac{4Q}{4\pi\varepsilon_0 d^2}$

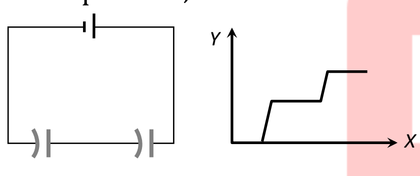
8. A solid conducting sphere of radius $R_1$ is surrounded by another concentric hollow conducting sphere of radius $R_2$. The capacitance of this assembly is proportional to

a) $\frac{R_2 - R_1}{R_1 R_2}$
b) $\frac{R_2 + R_1}{R_1 R_2}$
c) $\frac{R_1 R_2}{R_1 + R_2}$
d) $\frac{R_1 R_2}{R_2 - R_1}$

9. A $10\mu F$ capacitor is charged to a potential difference of 50 $V$ and is connected to another uncharged capacitor in parallel. Now the common potential difference becomes 20 $volt$. The capacitance of second capacitor is

a) $10\mu F$
b) $20\mu F$
c) $30\mu F$
d) $15\mu F$

10. Figure (a) shows two capacitors connected in series and joined to a battery. The graph in figure (b) shows the variation in potential as one moves from left to right on the branch containing the capacitors, if



(a) (b)

a) $C_1 > C_2$
b) $C_1 = C_2$
c) $C_1 < C_2$
d) The information is not sufficient to decide the relation between $C1$ and $C_2$

11. Three identical capacitors are combined differently. For the same voltage to each combination, the one that stores the greatest energy is

a) Two in parallel and the third in series with it
b) Three in series
c) Three in parallel
d) Two in series and third in parallel with it

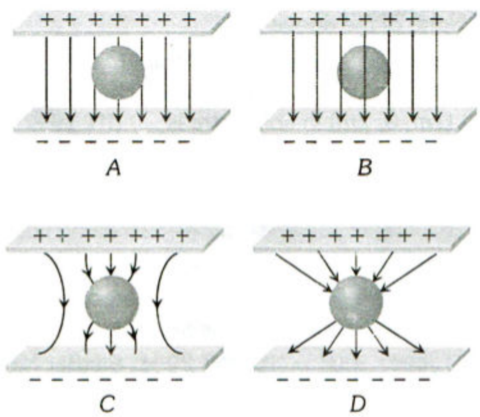
12. Three capacitors of $2\mu F$, $3\mu F$ and $6\mu F$ are joined in series and the combination is charged by means of a 24 $volt$ battery. The potential difference between the plates of the $6\mu F$ capacitor is

a) 4 $volt$
b) 6 $volt$
c) 8 $volt$
d) 10 $volt$

13. 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 $C$ is

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

14. An uncharged sphere of metal is placed in between two charged plates as shown.
The lines of force look like

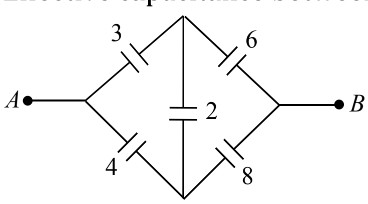



a) $A$ b) $B$ c) $C$ d) $D$

15. The capacity and the energy stored in a parallel plate condenser with air between its plates are respectively $C_0$ and $W_0$. If the air is replaced by glass (dielectric constant = 5) between the plates, the capacity of the plates and the energy stored in it will respectively be

a) $5C_0, 5W_0$ b) $5C_0, \frac{W_0}{5}$ c) $\frac{C_0}{5}, 5W_0$ d) $\frac{C_0}{5}, \frac{W_0}{5}$

16. Effective capacitance between $A$ and $B$ in the figure shown is (all capacitance are in $\mu F$)




a) $21\ \mu F$ b) $23\ \mu F$ c) $\frac{3}{14}\mu F$ d) $\frac{14}{3}\mu F$

17. Two charged spheres of radii 10 $cm$ and 15 $cm$ are connected by a thin wire. No charge will flow, if they have
a) The same charge on each
b) The same potential
c) The same energy
d) The same field on their surface

18. Point charges $q_1 = 2\mu C$ and $q_2 = -1\mu C$ are kept at points $x = 0$ and $x = 6$ respectively.

Electrical potential will be zero at points
a) $x = 2$ and $x = 9$
b) $x = 1$ and $x = 5$
c) $x = 4$ and $x = 12$
d) $x = -2$ and $x = 2$

19. The electric field due to an electric dipole at a distance $r$ from its centre in axial position is $E$. If the dipole is rotated through an angle of 90° about its perpendicular axis, the electric field at the same point will be
a) E
b) $\frac{E}{4}$
c) $\frac{E}{2}$
d) 2E

20. A total charge $Q$ is broken in two parts $Q_1$ and $Q_2$ and they are placed at a distance $R$ from each other. The maximum force of repulsion between them will occur, when
a) $Q_2 = \frac{Q}{R}, Q_1 = Q - \frac{Q}{R}$
b) $Q_2 = \frac{Q}{4}, Q_1 = Q - \frac{2Q}{3}$
c) $Q_2 = \frac{Q}{4}, Q_1 = \frac{3Q}{4}$
d) $Q_1 = \frac{Q}{2}, Q_2 = \frac{Q}{2}$