DPP

DAILY PRACTICE PROBLEMS

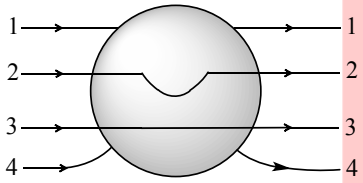
Class : XIIth **Subject : PHYSICS**

Date : **DPP No. : 8**

Topic :-Electric charges and fields

1. A sample of HCl gas is placed in an electric field of $3 \times 10^4\ NC^{-1}$. The dipole moment of each HCl molecule is $6 \times 10^{-30} c \times m$. The maximum torque that can act on a molecule is
   a) $2 \times 10^{-34} C^2 N^{-1} m$ b) $2 \times 10^{-34} Nm$
   c) $18 \times 10^{-26}\ Nm$ d) $0.5 \times 10^{34} C^{-2} N^{-1} m^{-1}$

2. A metallic solid sphere is placed in a uniform electric field. The lines of force follow the path(s) shown in figure as



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

3. Dimensions of ε_0 are
   a) $M^{-1}L^{-3}T^4A^2$ b) $M^0L^{-3}T^3A^3$ c) $M^{-1}L^{-3}T^3A$ d) $M^{-1}L^{-3}T\,A^2$

4. Two parallel metal plates having charges $+Q$ and $-Q$ face each other at a certain distance between them. If the plates are now dipped in kerosene oil tank, the electric field between the plates will
   a) Become zero b) Increase c) Decrease d) Remain same

5. What is not true for equipotential surface for uniform electric field?
   a) Equipotential surface is flat
   b) Equipotential surface is spherical
   c) Electric lines are perpendicular to equipotential surface
   d) Work done is zero

6. Two infinite plane parallel sheets separated by a distance d have equal and opposite uniform charge densities σ. Electric field at a point between the sheets is

a) Zero

b) $\frac{\sigma}{\varepsilon_0}$

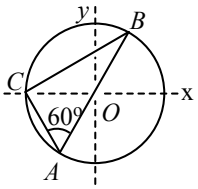
c) $\frac{\sigma}{2\varepsilon_0}$

d) Depends upon the location of the point

7. A charge Q is enclosed by a Gaussian spherical surface of radius R. If the radius is doubled, then the outward electric flux will

a) Be doubled b) Increase four times c) Be reduced to half d) Remain the same

8. Consider a system of three charges $\frac{q}{3}, \frac{q}{3}$ and $-\frac{2q}{3}$ placed at point A, B and C, respectively, as shown in the figure. Take O to be the centre of the circle of radius R and angle CAB=60°.



a) The electric field at point O is $\frac{q}{8\pi\varepsilon_0 R^2}$ directed along the negative x-axis

b) The potential energy of the system is zero

The magnitude of the force between the charges at C and B is

c) $\frac{q^2}{54\pi\varepsilon_0 R^2}$

The potential at point O is

d) $\frac{q}{12\pi\varepsilon_0 R}$

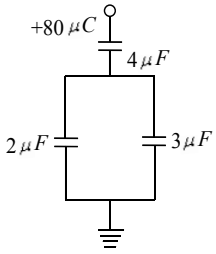
9. Four charges equal to $-Q$ are placed at the four corners of a square and a charge q is at its centre. If the system is in equilibrium the value of q is

a) $-\frac{Q}{4}(1+2\sqrt{2})$ b) $\frac{Q}{4}(1+2\sqrt{2})$ c) $-\frac{Q}{2}(1+2\sqrt{2})$ d) $\frac{Q}{2}(1+2\sqrt{2})$

10. Two conducting spheres of radii 5 cm and 10 cm are given a charge of 15μC each. After the two spheres are joined by a conducting wire, the charge on the smaller sphere is

a) 5μC b) 10μC c) 15μC d) 20μC

11. In the given circuit, a charge of $+80\ \mu C$ is given to the upper plate of the $4\ \mu F$ capacitor. Then in the steady state, the charge on the upper plate of the $3\ \mu F$ capacitor is

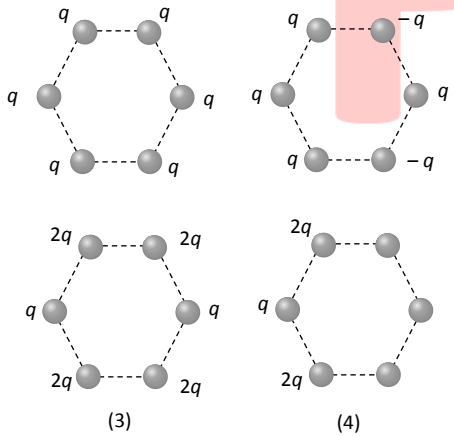


a) $+32\ \mu C$ b) $+40\ \mu C$ c) $+48\ \mu C$ d) $+80\ \mu C$

12. A hollow sphere of charge does not produce an electric field at any
a) Point beyond 2 metres b) Point beyond 10 metres
c) Interior point d) Outer point

13. A point Q lies on the perpendicular bisector of an electrical dipole of dipole moment p. If the distance of Q from the dipole is r (much larger than the size of the dipole), then the electric intensity E at Q is proportional to
a) r^{-2} b) r^{-4} c) r^{-1} d) r^{-3}

14. Figures below show regular hexagons, which charges at the vertices. In which of the following cases the electric field at the centre is not zero



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

15. If an insulated non-conducting sphere of radius R has charge density ρ. The electric field at a distance r from the centre of sphere ($r < R$) will be
a) $\frac{\rho R}{3\varepsilon_0}$ b) $\frac{\rho r}{\varepsilon_0}$ c) $\frac{\rho r}{3\varepsilon_0}$ d) $\frac{3\rho R}{\varepsilon_0}$

16. A soap bubble is given a negative charge, then its radius
a) Decreases b) Increases

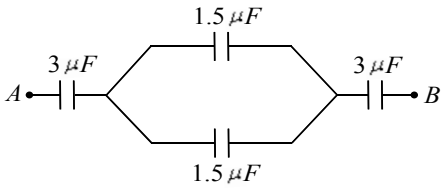
c) Remains unchanged

d) Nothing can be predicted as information is insufficient

17. Charge Q is placed on each of $(n-1)$ corners of a polygon of n sides. The distance of centre of the polygon from each corners is $'r'$, then electric field at centre is

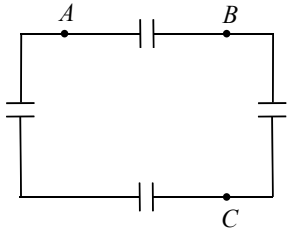
a) $\frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$ b) $\frac{(n-1)}{4\pi\varepsilon_0}\frac{Q}{r^2}$ c) $\frac{n}{(n-1)}\frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$ d) Zero

18. The capacitance between the points A and B in the given circuit will be



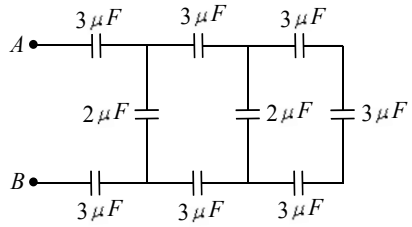
a) 1 μF b) 2 μF c) 3 μF d) 4 μF

19. Four capacitors of each of capacity $3\mu F$ are connected as shown in the adjoining figure. The ratio of equivalent capacitance between A and B and between A and C will be



a) 4 : 3 b) 3 : 4 c) 2 : 3 d) 3 : 2

20. The equivalent capacitance between A and B is (in μF)



a) 25 b) $\frac{84}{25}$ c) 9 d) 1