



Class : XIIth

Date :

DPP
DAILY PRACTICE PROBLEMS

Subject : PHYSICS

DPP No. : 1

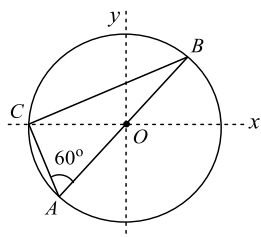
Topic :-Electric charges and fields

- Charge $q_1 = +6.0 \text{ nC}$ is on Y -axis at $y = +3 \text{ cm}$ and charge $q_2 = -6.0 \text{ nC}$ is on Y -axis at $y = -3 \text{ cm}$ calculate force on a test charge $q_0 = 2 \text{ nC}$ placed on X -axis at $x = 4 \text{ cm}$.
a) $-51.8 \hat{j} \mu\text{N}$ b) $+51.8 \hat{j} \mu\text{N}$ c) $-5.18 \hat{j} \mu\text{N}$ d) $5.18 \hat{j} \mu\text{N}$
- The electric intensity outside a charged sphere of radius R at a distance $r (r > R)$ is
a) $\frac{\sigma R^2}{\epsilon_0 r^2}$ b) $\frac{\sigma r^2}{\epsilon_0 R^2}$ c) $\frac{\sigma r}{\epsilon_0 R}$ d) $\frac{\sigma R}{\epsilon_0 r}$
- An uniform electric field E exists along positive x -axis. The work done in moving a charge 0.5 C through a distance 2 m along a direction making an angle 60° with x -axis is 10 J . Then the magnitude of electric field is
a) 5 Vm^{-1} b) 2 Vm^{-1} c) $\sqrt{5} \text{ Vm}^{-1}$ d) 20 Vm^{-1}
- 64 small drops of mercury, each of radius r and charge q coalesce to form a big drop. The ratio of the surface density of charge of each small drop with that of the big drop is
a) $1 : 64$ b) $64 : 1$ c) $4 : 1$ d) $1 : 4$
- Two point charges $100 \mu\text{C}$ and $5 \mu\text{C}$ are placed at points A and B respectively with $AB = 40 \text{ cm}$. The work done by external force in displacing the charge $5 \mu\text{C}$ from B to C , where $BC = 30 \text{ cm}$, angle $ABC = \frac{\pi}{2}$ and $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$
a) 9 J
b) $\frac{81}{20} \text{ J}$
c) $\frac{9}{25} \text{ J}$
d) $-\frac{9}{4} \text{ J}$
- An electric dipole is placed at an angle of 60° with an electric field of intensity 10^5 NC^{-1} . It experiences a torque equal to $8\sqrt{3} \text{ Nm}$. Calculate the charge on the dipole, if the dipole length is 2 cm .
a) $-8 \times 10^3 \text{ C}$ b) $8.54 \times 10^{-4} \text{ C}$ c) $8 \times 10^{-3} \text{ C}$ d) $0.85 \times 10^{-6} \text{ C}$
- A sphere of 4 cm radius is suspended within a hollow sphere of 6 cm radius. The inner sphere

is charged to potential 3 e.s.u. and the outer sphere is earthed. The charge on the inner sphere is

- a) 54 e.s.u.
- b) $1/4 \text{ e.s.u.}$
- c) 30 e.s.u.
- d) 36 e.s.u.

8. The angle subtended by a circular disk of diameter 2 cm at a distance 1000 cm from your eye is
 - a) 0.2°
 - b) 0.002°
 - c) 0.11°
 - d) 0.22°
9. Given that $q_1 + q_2 = q$. For what ratio q_1/q will the force between q_1 and q_2 be maximum?
 - a) 0.25
 - b) 0.5
 - c) 1
 - d) 2
10. Two plates are at potentials -10 V and $+30 \text{ V}$. If the separation between the plates be 2 cm . The electric field between them is
 - a) 2000 V/m
 - b) 1000 V/m
 - c) 500 V/m
 - d) 3000 V/m
11. Consider a system of three charges $\frac{q}{3}, \frac{q}{3}$ and $-\frac{2q}{3}$ placed at points A, B and C, respectively, as shown in the figure. Take O to be the centre of the circle of radius R and angle $CAB = 60^\circ$



- a) The electric field at point O is $\frac{q}{8\pi\epsilon_0 R^2}$ directed along the negative x -axis
 - b) The Potential energy of the system is zero
 - c) The magnitude of the force between the charges at C and B is $\frac{q^2}{54\pi\epsilon_0 R^2}$
 - d) The potential at point O is $\frac{q}{12\pi\epsilon_0 R}$
12. There is a uniform electric field of strength 10^3 V/m along y -axis. A body of mass 1 g and charge 10^{-6} C is projected into the field from origin along the positive x -axis with a velocity 10 m/s . Its speed in m/s after 10 s is (Neglect gravitation)
 - a) 10
 - b) $5\sqrt{2}$
 - c) $10\sqrt{2}$
 - d) 20
 13. A cylindrical capacitor has charge Q and length L . If both the charge and length of the capacitor are doubled, by keeping other parameters fixed, the energy stored in the capacitor
 - a) Remains same
 - b) Increases two times
 - c) Decreases two times
 - d) Increases four times
 14. The electrostatic potential inside a charged spherical ball is given by $\phi = ar^2 + b$ where r is the distance from the centre, a, b are constants. Then the charge density inside the ball is
 - a) $-6a\epsilon_0 r$
 - b) $-24\pi a\epsilon_0$
 - c) $-6a\epsilon_0$
 - d) $-24\pi a\epsilon_0 r$
 15. Can a metal be used as a medium for dielectric

- a) Yes
 c) Depends on its shape
 b) No
 d) Depends on dielectric

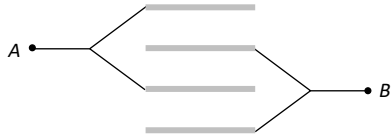
16. The electric potential V is given as a function of distance x (metre) by $V = (5x^2 + 10x - 9) \text{ volt}$. Value of electric field at $x = 1$ is

- a) -20 V/m b) 6 V/m c) 11 V/m d) -23 V/m

17. The work done in carrying a charge of $5 \mu\text{C}$ from a point A to a point B in an electric field is 10 mJ . The potential difference ($V_B - V_A$) is then

- a) $+2 \text{ kV}$ b) -2 kV c) $+200 \text{ V}$ d) -200 V

18. Four plates of the same area of cross-section are joined as shown in the figure. The distance between each plate is d . The equivalent capacity across A and B will be



- a) $\frac{2\epsilon_0 A}{d}$ b) $\frac{3\epsilon_0 A}{d}$ c) $\frac{3\epsilon_0 A}{2d}$ d) $\frac{\epsilon_0 A}{d}$

19. A hollow conducting sphere of radius R has a charge $(+Q)$ on its surface. What is the electric potential within the sphere at a distance $r = R/3$ from its centre

- a) Zero b) $\frac{1}{4\pi\epsilon_0} \frac{Q}{r}$ c) $\frac{1}{4\pi\epsilon_0} \frac{Q}{R}$ d) $\frac{1}{4\pi\epsilon_0} \frac{Q}{r^2}$

20. The capacity of a spherical conductor in MKS system is

- a) $\frac{R}{4\pi\epsilon_0}$ b) $\frac{4\pi\epsilon_0}{R}$ c) $4\pi\epsilon_0 R$ d) $4\pi\epsilon_0 R^2$