

Chapter 1 Electric Charges and Fields

Assignment 1

Class 12

Prerna Edu

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DPP

DAILY PRACTICE PROBLEMS

Class : XIIth

Date :

Subject : PHYSICS

DPP No. : 1

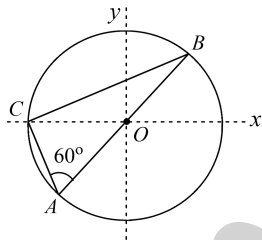
Topic :-Electric charges and fields

- Charge $q_1 = +6.0$ nC is on Y -axis at $y = +3$ cm and charge $q_2 = -6.0$ nC is on Y -axis at $y = -3$ cm calculate force on a test charge $q_0 = 2$ nC placed on X -axis at $x = 4$ 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 $AB = 40$ cm. The work done by external force in displacing the charge $5 \mu\text{C}$ from B to C , where $BC = 30$ 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 $8\sqrt{3}$ 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) $0.85 \times 10^{-6} \text{ C}$

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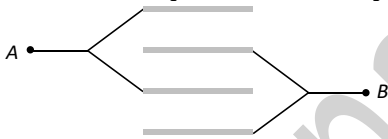
7. A sphere of 4 cm radius is suspended within a hollow sphere of 6 cm radius. The inner sphere is charged to potential 3 e. s. u. and the outer sphere is earthed. The charge on the inner sphere is
- a) $54e. s. u.$
 b) $1/4e. s. u.$
 c) $30e. s. u.$
 d) $36e. s. u.$
8. The angle subtended by a circular 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 $+30 V$. 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 $1g$ and charge $10^{-6} C$ is projected into the field from origin along the positive x -axis with a velocity $10m/s$. Its speed in m/s after 10s is (Neglect gravitation)
- a) 10 b) $5\sqrt{2}$ c) $10\sqrt{2}$ d) 20

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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 b) No
c) Depends on its shape d) Depends on dielectric
16. The electric potential V is given as a function of distance x (metre) by $V = (5x^2 + 10x - 9)$ volt. Value of electric field at $x = 1$ is
- a) $-20V/m$ b) $6V/m$ c) $11V/m$ d) $-23V/m$
17. The work done in carrying a charge of $5\mu C$ from a point A to a point B in an electric field is $10mJ$. The potential difference ($V_B - V_A$) is then
- a) $+2kV$ b) $-2kV$ c) $+200V$ d) $-200V$
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
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- 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) $4\pi\epsilon_0 R^2$