

BCM SCHOOL, BASANT AVENUE, DUGRI, LUDHIANA



Class: XII

SUBJECT: Physics

UNIT : Electrostatics

Date: May 11, 2026.

Assignment: 1

Multiple Choice Questions (MCQ's).

- A uniformly charged solid sphere of radius R has potential V_0 (measured with respect to ∞) on its surface. For this sphere the equipotential surface with potential surface with potentials $\frac{3V}{2}$, $\frac{5V}{4}$, $\frac{3V}{4}$, and $\frac{V}{4}$, have radii R_1 , R_2 , R_3 , and R_4 respectively. Then
 - $R_1 = 0$ and $R_2 > (R_4 - R_3)$
 - $R_1 \neq 0$ and $(R_2 - R_1) > (R_4 - R_3)$
 - $R_1 = 0$ and $R_2 < (R_4 - R_3)$
 - $2R < R_4$
- A uniform electric field pointing in positive X-direction exists in a region. Let A be the origin, B be the point on the X-axis at $x = +1$ cm and C be the points on the Y-axis at $y = +1$ cm. Then the potential at points A , B and C satisfy.
 - $V_A < V_B$
 - $V_A > V_B$
 - $V_A < V_C$
 - $V_A > V_C$
- The electrostatic force between the metal plates of an isolated parallel plate capacitor C having a charge Q and area A , is
 - Proportional to the square root of the distance between the plates
 - Linearly proportional to the distance between the plates
 - Independent of the distance between the plates
 - Inversely proportional to the distance between the plates
- Effective capacitance of parallel combination of two capacitors C_1 and C_2 is $10 \mu\text{F}$. When these capacitors are individually connected to a voltage source of 1 V, the energy stored in the capacitor C_2 is 4 times that of C_1 . If these capacitors are connected in series, their effective capacitance will be
 - $1.6 \mu\text{F}$
 - $4.2 \mu\text{F}$
 - $8.4 \mu\text{F}$
 - $3.2 \mu\text{F}$

Short Answer Type Question's

- Find the acceleration of an electron due to the mutual attraction between the electron and a proton when they are 1.6 \AA apart is, ($m_e = 9 \times 10^{-31} \text{ kg}$, $e = 1.6 \times 10^{-19} \text{ C}$) (Take, $1/4\pi\epsilon_0 = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2}$)
- Two point charges A and B , having charges $+Q$ and $-Q$ respectively, are placed at certain distance apart and force acting between them is F . If 25% charge of A is transferred to B , then find force between the charge's
- An electric dipole is placed at an angle of 30° with an electric field of intensity $2 \times 10^5 \text{ NC}^{-1}$. It experience a torque equal to 4 N m . Calculate the magnitude of charge on the dipole, if the dipole length is 2 cm .
- An electric dipole is placed at an angle of 30° with an electric field intensity $2 \times 10^5 \text{ N/C}$. It experience a torque equal to 4 Nm . Find the charge on the dipole, if the dipole length is 2 cm .
- An electric dipole, consisting of two opposite charges of $2 \times 10^{-6} \text{ C}$ each separated by a distance 3 cm is placed in an electric field of $2 \times 10^5 \text{ N/C}$. Torque on the dipole is
- An electric dipole has a fixed dipole moment p , which makes angle θ with respect to x- axis. When subjected to an electric field. $E_1 = Ei$, it experience a torque $T_1 = \tau k$. When subjected to another electric

field $E_2 = \sqrt{3} E_1 j$, it experience a torque $T_2 = -T_1$. Then find angle θ .

7. Two point charges $+8q$ and $-2q$ are located at $x = 0$ and $x = L$ respectively. Find the location of a point on X- axis at which the net electric field due to these two point charges is zero .
8. Two parallel infinite line charges with linear charge densities $+\lambda$ C/m and $-\lambda$ C/m are placed at a distance of $2R$ in free space. What is the electric field mid-way between the two line charges?
9. A charge $q \mu C$ is placed at the center of a cube of a side 0.1 m, Find the electric flux diverging from each face of the cube.
10. Twenty seven drops of same size are charged at 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop.
11. Two metal spheres, one of radius R and the other of radius $2R$ respectively have the same surface charge density σ . They are brought in contact and separated. What will be the new surface charge densities on them?
12. . If potential (in volts) in a region is expressed as $V(x,y,z) = 6xy - y + 2yz$, Find the electric field (in N/C) at point $(1, 1, 0)$.
13. Four point charges $-Q, -q, 2q$ and $2Q$ are placed, one at each corner of the square. Find the relation between Q and q for which the potential at the center of the square is zero.
14. An electric field $E = (25i + 30j) \text{ NC}^{-1}$ exists in a region of space. If the potential at the origin is taken to be zero, then find the potential at $x = 2 \text{ m}, y = 2 \text{ m}$.
15. A short electric dipole has a dipole moment of $16 \times 10^{-9} \text{ C-m}$. Find the electric potential due to the dipole at a point at a distance of 0.6 m from the center of the dipole, situated on a line making an angle of 60° with the dipole

16. **CASE STUDY BASED QUESTIONS:**

A device used to store large amount of charge in small space is called capacitor. It is an electronic component with two terminals. Capacitor has two identical and conducting plates having a non-conducting medium between them. Non-conducting medium can be air or a dielectric. Capacitance of capacitor is defined as the ratio of magnitude of charge present on each conductor to voltage developed between the plates. Capacitance depends upon structure of capacitor.

1. Capacitance of an air capacitor depends on.

- (a) Charge stored on its plates
- (b) Voltage between the plates
- (c) Thickness of plates
- (d) Area of plates

2. When a dielectric is placed in an electric field, the electric field inside the dielectric

- (a) Increases
- (b) Constant
- (c) Zero
- (d) Decreases

Or

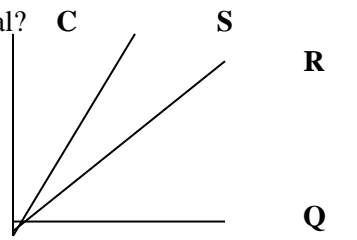
The capacitance of capacitor will become infinite if we introduce a slab of

- (a) Copper
- (b) Glass
- (c) Mica
- (d) Air

3. A capacitor has capacitance equal to $5\mu\text{F}$. If a dielectric ($K=4$) is inserted in half of the portion between the plates, what is the new capacitance?

- (a) $8 \mu\text{F}$
- (b) $4 \mu\text{F}$
- (c) Zero
- (d) $1 \mu\text{F}$

2. The graph shows the variation of capacitance of two capacitors R and S versus charge stored on them. Which of the capacitor has higher potential?



(a) R
above

(b) S

(c) Same

(d) None of the