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Class 12Sc Sub Physics Date 11 01 21
Important Questions of electrostatics –

Electrostatic Potential and Capacitance Class 12 Important Questions Very Short Answer Type

Question 1.

A $500 \mu\text{C}$ charge is at the centre of a square of side 10 cm. Find the work done in moving a charge of $10 \mu\text{C}$ between two diagonally opposite points on the square. (Delhi 2008)

Answer:

The work done in moving a charge of $10 \mu\text{C}$ between two diagonally opposite points on the square will be zero because these two points will be at equipotential.

Question 2.

What is the electrostatic potential due to an electric dipole at an equatorial point? (All India 2009)

Answer:

Electric potential at any point in the equatorial plane of dipole is Zero.

Question 3.

What is the work done in moving a test charge q through a distance of 1 cm along the equatorial axis of an electric dipole? (All India 2009)

Answer:

Since potential for equatorial axis

$$V = 0$$

$$\therefore W = qV = 0$$

Question 4.

Define the term 'potential energy' of charge ' q ' at a distance V in an external electric field. (All India 2009)

Answer:

It is defined as the amount of work done in bringing the charge from infinity to its position in the system in the electric field of another charge without acceleration.

$$V = Er.$$

Question 5.

A point charge Q is placed at point O as shown in the figure. Is the potential difference $V_A - V_B$ positive, negative or zero, if Q is

(i) positive

(ii) negative? (Delhi 2011)



Answer:

Clearly,

$$V_A - V_B = \left(\frac{1}{4\pi\epsilon_0} \cdot \frac{q}{OA} \right) - \left(\frac{1}{4\pi\epsilon_0} \cdot \frac{q}{OB} \right)$$
$$= \frac{q}{4\pi\epsilon_0} \cdot \left[\frac{1}{OA} - \frac{1}{OB} \right]$$

As $OA < OB$, so the quantity within bracket is negative.

(i) If q is positive charge, $V_A - V_B =$ negative

(ii) If q is negative charge, $V_A - V_B =$ positive

Question 6.

A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. What is the potential at the centre of the sphere?

(All India 2011)

Answer:

The electric field inside the shell is zero. This implies that potential is constant inside the shell (as no work is done in moving a charge inside the shell) and, therefore, equals its value at the surface, which is 10 V.

Question 7.

A hollow metal sphere of radius 10 cm is charged such that the potential on its surface is 5 V. What is the potential at the centre of the sphere? (All India 2011)

Answer:

Hollow metal sphere behaves as an equipotential surface, so the potential at its centre will be 5 V.

Question 8.

Why is electrostatic potential constant throughout the volume of the conductor and has the same value (as inside) on its surface? (Delhi 2012)

Answer:

Electric field inside the conductor = 0

$$E = -\frac{dV}{dr} \Rightarrow \frac{dV}{dr} = 0 \quad \therefore V = \text{constant}$$

Question 9.

Distinguish between dielectric and a conductor (Comptt. Delhi 2012)

Answer:

Dielectric	Conductor
Dielectrics are the insulating materials which transmit electric effects without conducting.	Conductors are the substances which can be used to carry or conduct electric charge from one place to the other.

Question 10.

Why must the electrostatic potential inside a hollow charged conductor be the same at every point? (Comptt. All India 2012)

Answer:

Inside the hollow charged conductor, electric field is zero therefore no work is done in moving a small test charge within the conductor. Hence electrostatic potential inside a hollow charged conductor is same at every point.
