1.

Which of the following is not the property of charge?

1. Like point charges repel each other
2. For an isolated system, the net charge is conserved
3. Specific charge is invariant
4. Charge is quantized

2.

A particle of mass m and carrying charge -q_1 is moving around a charge +q_2 along a circular path of radius r. Find the period of revolution of the charge -q_1.

1. $\sqrt{\frac{16\pi^3\varepsilon_0 mr^3}{q_1q_2}}$
2. $\sqrt{\frac{8\pi^3\varepsilon_0 mr^3}{q_1q_2}}$
3. $\sqrt{\frac{q_1q_2}{16\pi^3\varepsilon_0 mr^3}}$
4. Zero

3.

A point charge +q is placed at a distance d from an isolated conducting plane. The field at a point P on the other side of the plane is?

(1) directed perpendicular to the plane and away from the plane

(2) directed perpendicular to the plane but towards the plane

(3) directed radially away from the point charge

(4) directed radially towards the point charge

4.

When 10^{19} electrons are removed from a neutral metal plate, the electric charge on it is?

(1) –1.6 C

(2) +1.6 C

(3) 10^{+19} C

(4) 10^{-19} C

5.

One metallic sphere *A* is given positive charge whereas another identical metallic sphere B of exactly same mass as of A is given equal amount of negative charge. Then:

(1) Mass of *A* and mass of *B* is the same

(2) Mass of *A* is more

(3) Mass of *B* is less

(4) Mass of *B* is more

6.

Suppose the charge of a proton and an electron differ slightly. One of them is –e, the other is (e+ Δe). If the net of electrostatic force and gravitational force between two hydrogen atoms placed at a distance d (much greater than atomic size) apart is zero, then Δe is of the order of? [Given mass of hydrogen $m_h = 1.67 \times 10^{-27}$ kg]

1. 10^{-23} C
2. 10^{-37} C
3. 10^{-47}C
4. 10^{-20} C

7.

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 force between the charges becomes:

1. $\frac{4F}{3}$
2. F
3. $\frac{9F}{16}$
4. $\frac{16F}{9}$

8.
Two identical charged spheres suspended from a common point by two massless strings of lengths l, are initially at a distance d (d << l) apart because of their mutual repulsion. The charges begin to leak from both the spheres at a constant rate. As a result, the spheres approach each other with a velocity v. Then, v varies as a function of the distance x between the sphere, as
1. $v \propto x$
2. $v \propto x^{-1/2}$
3. $v \propto x^{-1}$
4. $v \propto x^{1/2}$

9.
A charge q is to be divided into two small conducting spheres. What should be the value of charges on the spheres so that when placed at a certain distance apart, the repulsive force between them is maximum?

(1) $\frac{q}{4}$ and $\frac{3q}{4}$

(2) $\frac{q}{2}$ and $\frac{q}{2}$

(3) $\frac{q}{3}$ and $\frac{q}{3}$

(4) $\frac{q}{4}$ and $\frac{q}{4}$

10.
Two charges 2 μC and 8μC are separated by 6 cm. Neutral point is

1. 4 cm from 2 μC
2. 2 cm from 2 μC
3. 2 cm from 8 μC
4. 3 cm from 8 μC

11.
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

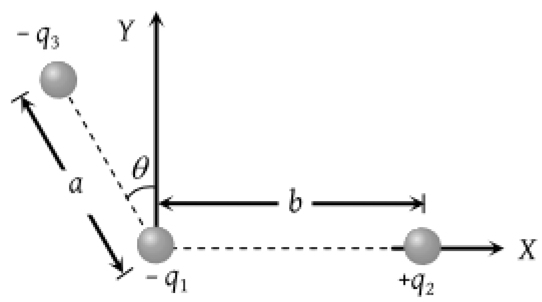
1. $-\frac{Q}{4}(1+2\sqrt{2})$

2. $\frac{Q}{4}(1+2\sqrt{2})$

3. $-\frac{Q}{2}(1+2\sqrt{2})$

4. $\frac{Q}{2}(1+2\sqrt{2})$

12.
Three charges $-q_1$, $+q_2$ and $-q_3$ are placed as shown in the figure. The x-component of the force on $-q_1$ is proportional to



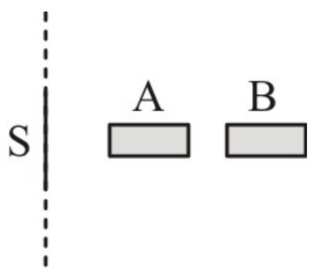
(1) $\frac{q_2}{b^2}-\frac{q_3}{a^2}\sin\theta$

(2) $\frac{q_2}{b^2}-\frac{q_3}{a^2}\cos\theta$

(3) $\frac{q_2}{b^2}+\frac{q_3}{a^2}\sin\theta$

(4) $\frac{q_2}{b^2}+\frac{q_3}{a^2}\cos\theta$

13.
A large non-conducting sheet S is given a uniform charge density. Two uncharged small, metal rods A and B are placed near the sheet as shown in the following diagram. Then the incorrect option is



1. S attracts A
2. S attracts B
3. A attracts B
4. S repels A

14.
A hollow metal sphere of radius R is uniformly charged. The electric field due to the sphere at a distance r from the centre:

1. decreases as r increases for r < R and for r > R

2. increases as r increases for r < R and for r > R

3. zero as r increases for r < R, decreases as r increases for r > R

15.

A spherical conductor of radius 10 cm has a charge of 3.2 x 10^{-7} C distributed uniformly. What is the magnitude of the electric field at a point 15 cm from the center of the sphere?

$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2\right)$

1. 1.28 x 10^5 N/C

2. 1.28 x 10^6 N/C

3. 1.28 x 10^7 N/C

4. 1.28 x 10^4 N/C

16.

An electron falls from rest through a vertical distance h in a uniform and vertically upward-directed electric field E. The direction of the electric field is now reversed, keeping its magnitude the same. A proton is allowed to fall from rest through the same vertical distance h. The fall time of the electron in comparison to the fall time of the proton is:-

1. smaller

2. 5 times greater

3. 10 times greater

4. equal

17.

An electron enters an electric field with its velocity in the direction of the electric lines of force. Then

(1) The path of the electron will be a circle

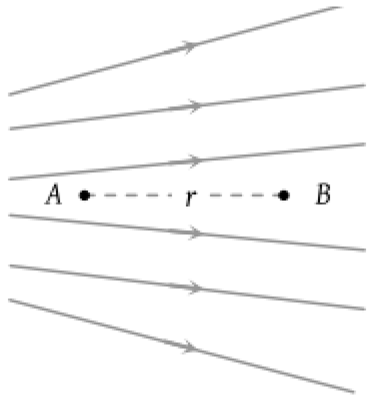
(2) The path of the electron will be a parabola

(3) The velocity of the electron will decrease

(4) The velocity of the electron will increase

18.

Figure shows the electric lines of force emerging from a charged body. If the electric field at A and B are E_A and E_B respectively and if the distance between A and B is r, then



(1) $E_A > E_B$

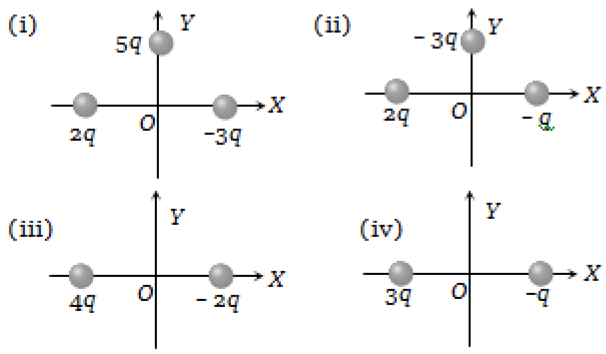
(2) $E_A < E_B$

(3) $E_A = \frac{E_B}{r}$

(4) $E_A = \frac{E_B}{r^2}$

19.

In the following four situations charged particles are at equal distance from the origin. Arrange the magnitude of the net electric field at origin ,greatest first



1. (i) > (ii) > (iii) > (iv)

2. (ii) > (i) > (iii) > (iv)

3. (i) > (iii) > (ii) > (iv)

4. (iv) > (iii) > (ii) > (i)

20.

The equation of trajectory of a charged particle moving in xy plane in a uniform electric field maybe

1. $y = 2x + 8$
2. $x = y^2 + 4$
3. $y = 2x^2 + 6$
4. All of these

Fill OMR Sheet