



PHYSICS

BOOKS - BITSAT GUIDE

ELECTRIC CHARGE

Others

1. One brass plate is inserted between two charges. The force between two charges will be

A. remain the same

B. increase

C. decrease

D. fluctuate

Answer:



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2. A sure test of electification is

A. attraction

B. repulsion

C. friction

D. induction

Answer:



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3. In relativistic mechanics $m = \frac{m_0}{\sqrt{\left(1 - \frac{v^2}{c^2}\right)}}$

the equivalent relation in electricity for electric charge is

$$A. q = q_0$$

$$B. q = \frac{q_0}{\sqrt{\left(1 - \frac{v^2}{c^2}\right)}}$$

$$C. q_0 = \frac{q}{\sqrt{\left(1 - \frac{v^2}{c^2}\right)}}$$

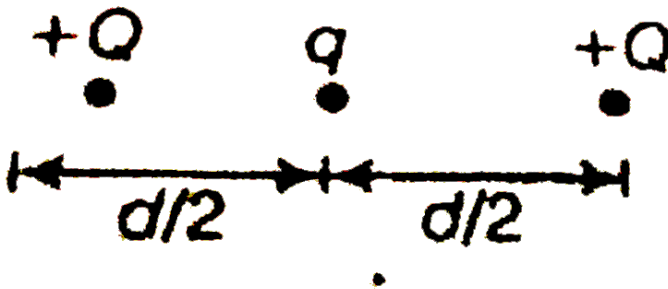
$$D. q = \frac{q_0 v}{c}$$

Answer:



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4. Two positively charged particles each having charge Q and are d distance apart. A third charge is introduced in midway on the line joining the two charges. Find the nature and magnitude of third charge so that the system is in equilibrium.



A. $q = \frac{Q}{4}$

B. $q = \frac{Q}{4}$

$$\text{C. } q = \frac{3Q}{4}$$

$$\text{D. } q = -\frac{3Q}{4}$$

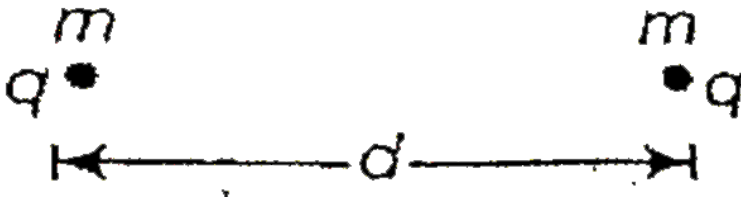
Answer:



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5. As shown in the adjoining figure two charge particles each having charge q and mass m and d distance apart from each other. If two particle in equilibrium under the gravitational and electric force, then determine the ratio

q/m .



A. 10^{-8}

B. 10^{-10}

C. 10^{10}

D. none

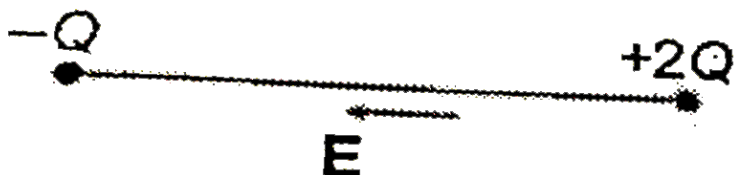
Answer:



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6. Charge $+2Q$ and $-Q$ are placed as shown in figure.

The point at which electric field intensity is zero will be



- A. somewhere between $-Q$ and $+2Q$
- B. somewhere on the left of $-Q$
- C. somewhere on the right of $+2Q$

D. somewhere on the right bisector of line
joining $-Q$ and $+2Q$

Answer:



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7. Two equal and oppositely charged particles are kept at some distance apart from each other. A spherical surface having radius equal to separation between the particles and

concentric with their mid-point is considered. Then

- A. electric field is normal to the surface at two points
- B. electric field is zero at no point
- C. electric potential is zero at every point of one circle only
- D. All of the above

Answer:



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8. Two bodies A and B of definite shape are placed near one another. Electrostatic attraction is found between the bodies, then

- A. both bodies must be positive charged
- B. both bodies must be negatively charged
- C. both bodies must be oppositely charged
- D. both A may be neutral

Answer:



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9. If $\sigma =$ surface charge density $\epsilon =$ electric permittivity the dimension of $\frac{\sigma}{\epsilon}$ are same as

- A. electric force
- B. electric field intensity
- C. pressure
- D. electric charge

Answer:



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10. What is the magnitude of a point charge due to which the electric field 30cm away the magnitude 2?

$$\left[1/4\pi\epsilon_0 = 9 \times 10^9 \text{Nm}^2 / \text{C}^2\right]$$

A. $2 \times 10^{-11} \text{C}$

B. $3 \times 10^{-11} \text{C}$

C. $5 \times 10^{-11} \text{C}$

D. $9 \times 10^{-11} \text{C}$

Answer:



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11. A charged particle of mass m and charge q is released from rest the position $(x_0, 0)$ in a uniform electric field $E_0 \hat{j}$. The angular momentum of the particle about origin.

- A. is zero
- B. is constant
- C. increses with time
- D. decreases with time

Answer:



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12. An infinite plane sheet of positive charge has surface charge density σ . A metallic ball of mass m and charge $+Q$ is attached to a thread and is tied to a point A on the sheet PQ . The angle θ made by the string with plane sheet is in equilibrium is

A. zero

B. $\tan^{-1} \left(\frac{Q\sigma}{4\epsilon_0 mg} \right)$

C. $\tan^{-1} \left(\frac{Q\sigma}{2\epsilon_0 mg} \right)$

D. $\tan^{-1} \left(\frac{Q\sigma}{\epsilon_0 mg} \right)$

Answer:



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13. A dimensionless body having a physical quantity varies as $1/r^2$, where r is distance from the body. This physical quantity may be

A. gravitational potential

B. electric field

C. gravitational field

D. none of these

Answer:



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14. The electric field inside a conductor

A. must be zero

B. may be nonzero

C. must be non zero

D. Both (a) and (c) are correct

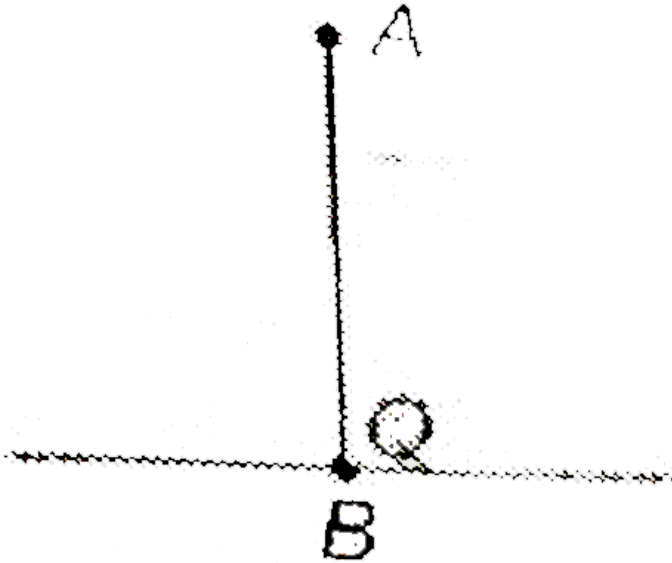
Answer: B



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15. A point charge Q is situated at point B on the ground. A point charge q of mass m is vertically dropped along line AB from a multi storey building of height h . Find the position

of the point charge q when it is in equilibrium



A. $\sqrt{\left(\frac{qQ}{4\pi\epsilon_0 mg}\right)}$

B. $\frac{Q}{h^2}$

C. $\frac{qh}{m}$

D. none of these

Answer:



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16. Two point charges q_1 and q_2 are released from rest in a gravity free hall when distance between them is a . Find the maximum speeds of charged particle. The mass of each charged particle is m .

A. $\frac{q_1 q_2}{4\pi\epsilon_0 a}$

B. $\sqrt{\frac{(q_1 q_2)}{4\pi\epsilon_0 m a}}$

C. $\sqrt{\left(\frac{2q_1q_2}{4\pi\epsilon_0ma}\right)}$

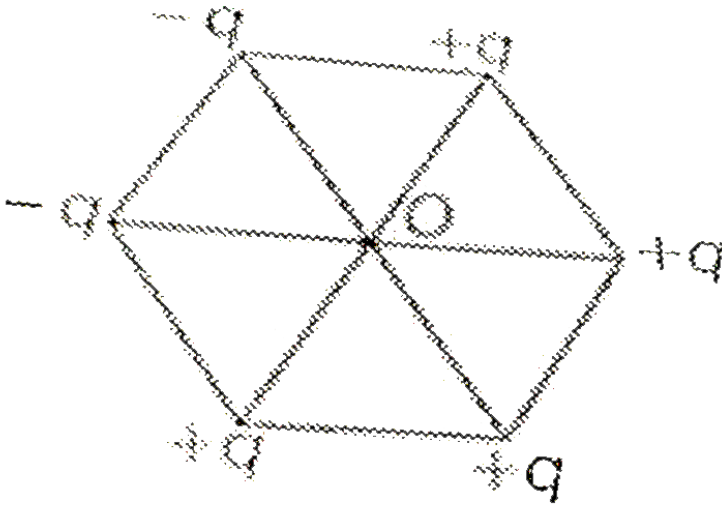
D. none of these

Answer:



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17. Six point charges are arranged at the vertices of a regular hexagon of side length a (shown in figure).



Find the magnitude of electric field at the centre of regular hexagon.

A. $\frac{q}{4\pi\epsilon_0 a^2}$

B. zero

C. $\frac{q}{2\pi\epsilon_0 a^2}$

D. none of these

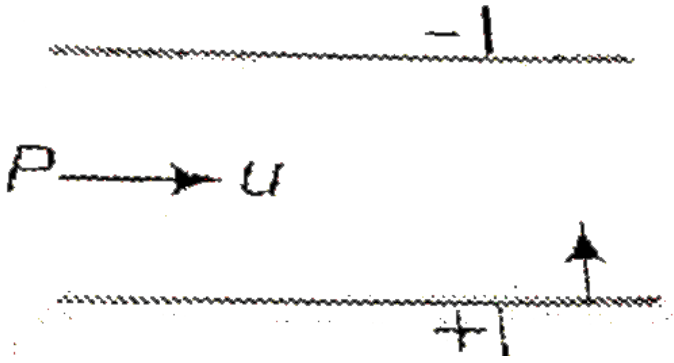
Answer:



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18. A positive charged particle P enters the region between two parallel plates with a velocity u , in a direction parallel to the plates. There is a uniform electric field in the region. P emerges from this region with a velocity v .

Taking C as a constant v will depend on u as



A. $v = Cu$

B. $v = \sqrt{u^2 + Cu}$

C. $v = \sqrt{u^2 + \frac{C}{u}}$

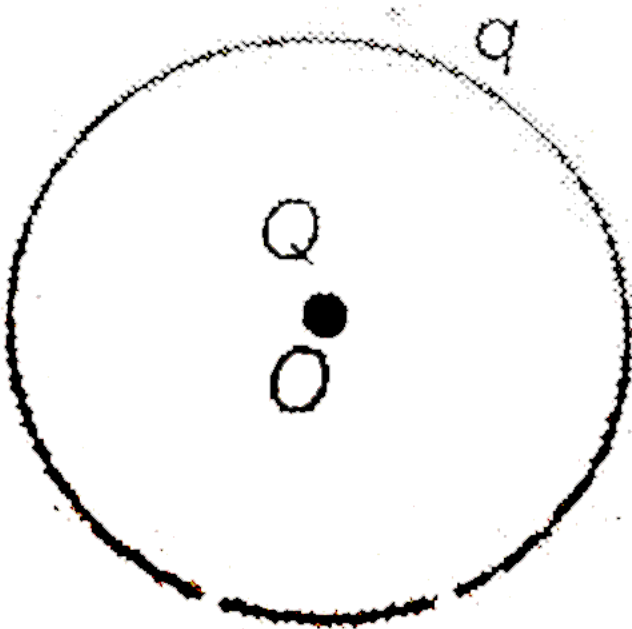
D. $v = \sqrt{u^2 + \frac{C}{u^2}}$

Answer:



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19. A point charge Q is placed at the centre of a circular wire of radius R having charge q . Find the force of electrostatic interaction between point charge and the wire.



A. $\frac{qQ}{4\pi\epsilon_0 R^2}$

B. zero

C. $\frac{q^2}{4\pi\epsilon_0 R}$

D. none of these

Answer:



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20. A small element l cut from a circular ring of radius a and λ charge per unit length. The net electric field at the centre of ring is

A. zero

B. $\frac{\lambda l}{4\pi\epsilon_0 a^2}$

C. ∞

D. $\frac{\lambda}{4\pi\epsilon l}$

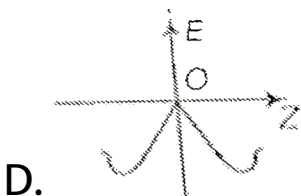
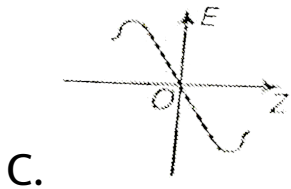
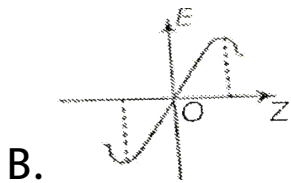
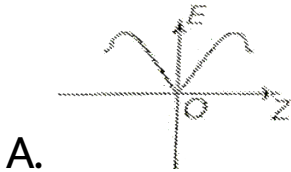
Answer:



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21. A circular ring carries a uniformly distributed positive charge and lies in the xy plane with center at the origin of the

coordinated system. If at a point $(0,0,z)$ the electric field is E , then which of the following graphs is correct?

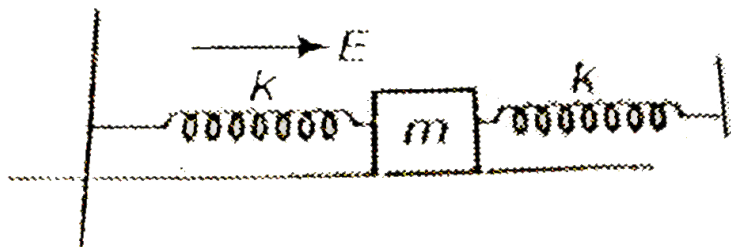


Answer:



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22. A particular of mass m and having a charge q is placed on a smooth horizontal table and is connected to walls through unstressed springs of constant k (shown in figure). A horizontal electric field E parallel to spring is switched On. The maximum speed of the particle



A. $\frac{qE}{\sqrt{(2mk)}}$

B. $\frac{qE}{mk}$

C. $\frac{qE}{m}$

D. none of these

Answer:



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23. A point charge is projected along the axis of circular ring of charge Q and radius $10\sqrt{2}cm$. The distance of the point charge

from centre of ring, where acceleration of charged particle is maximum, will be

A. 10cm

B. 20cm

C. at infinity

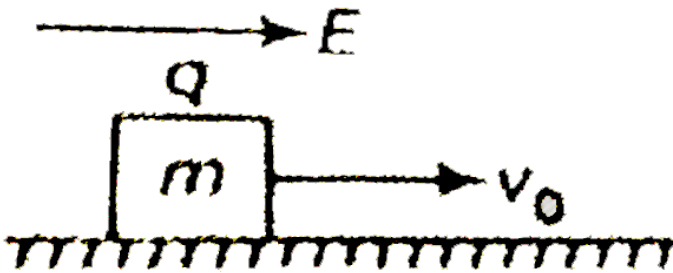
D. none of the above

Answer:



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24. If a charged particle is projected on a rough horizontal surface with speed v_0 . Find the value of dynamic coefficient of friction, if the kinetic energy of system is constant.



A. $\frac{qE}{mg}$

B. $\frac{qE}{m}$

C. $\frac{q}{g}$

D. none of these

Answer:



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25. Two charges of value $2\mu C$ and $-50\mu C$ are placed at in distance 80cm apart. Calculate the distance of the point from the smaller charge, where the intensity will be zero.

A. 20cm

B. 35cm

C. 30cm

D. 25cm

Answer:



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26. Two charged particles of charge $+2q$ and $+q$ have masses m and $2m$ respectively. Then are kept in uniform electric field allowed to

move for the same time. Find the ratio of their kinetic energies.

A. 1 : 8

B. 16 : 1

C. 2 : 1

D. 3 : 1

Answer:



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27. An oil drop of charge of 2 electrons fall freely with its terminal speed. Calculate the mass of oil drop so, it can move upward with same terminal speed, if electric field of $2 \times 10^3 \text{ V/m}$ is applied.

A. $3.0 \times 10^{-17} \text{ kg}$

B. $3.2 \times 10^{-17} \text{ kg}$

C. $2.5 \times 10^{-17} \text{ kg}$

D. $3.3 \times 10^{-17} \text{ kg}$

Answer:



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28. A Pendulum bob of mass m and charge q is suspended by a thread of length l . The pendulum is placed in a region of a uniform electric field E directed vertically upward. If the electrstatic force acting on the sphere is less than that of gravitational fore, calculate the period with which the pendulum oscillates (Assumes small oscillation)

$$A. T = 2\pi \sqrt{\frac{l}{g + \frac{qE}{m}}}$$

$$\text{B. } T = 2\pi \sqrt{\frac{l}{g - \frac{qE}{m}}}$$

$$\text{C. } T = \pi \sqrt{\frac{l}{g - \frac{qE}{m}}}$$

$$\text{D. } T = \pi \sqrt{\frac{l}{g + \frac{qE}{m}}}$$

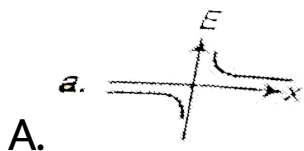
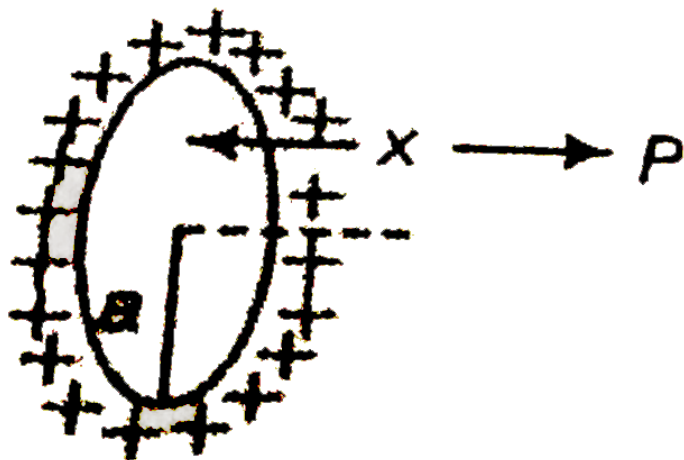
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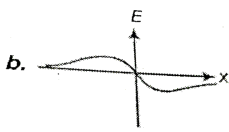


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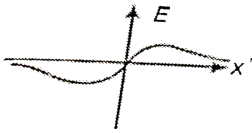
29. A ring shaped conductor with radius a carries a net positive charge q uniformly distributed on it as shown in figure. A point P

is situated at a distance x from its centre.
Which of following graph shows the correct
variation of electric field (E) with distance
(x)?





B.



C.

D. None of these

Answer:

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30. The electrostatic force of repulsion between two positively charged ions carrying equal charge is $3.7 \times 10^{-9} N$, when they are

separated by a distance of 5\AA . How much electrons are missing from each ion?

A. 10

B. 8

C. 2

D. 1

Answer:



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31. Two equal charges q are kept fixed at a and $+a$ along the x -axis. A particle of mass m and charge $\frac{q}{2}$ is brought to the origin and given a small displacement along the x -axis then

- A. the particle executes oscillatory motion
- B. the particle remains stationary
- C. the particle executes, SHM along x -axis
- D. the particle executes SHM along y -axis

Answer:



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32. The magnitude of electric field intensity E is such that, an electron placed in it would experience an electrical force equal to its weight is given by

A. mge

B. $\frac{mg}{e}$

C. $\frac{e}{mg}$

D. $\frac{e^2}{m^2}g$

Answer:



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33. Which one of the following is correct statement?

A. Electric field is always conservative

B. Electric field due to varying magnetic field is conservative

C. Electric field is conservative due to electrostatic charges while non-conservative due to time varying magnetic field

D. Electric field lines are always closed loops

Answer:



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34. A charge of $1\mu C$ is divided into two parts such that their charges are in the ratio of 2:3. These two charges are kept at a distance $1m$ apart in vacuum. Then, the electric force between them (in N) is

A. 0.216

B. 0.00216

C. 0.0216

D. 2.16

Answer:



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35. An electric line of forces in the x - y plane is given by the equation $x^2 + y^2 = 1$. A particle with unit positive charge, initially at rest at the point $x = 1, y = 0$ in the x - y plane, will move along the circular line of force.

A. not move at all

B. will move along straight line

C. will move along the circular line of force

D. information is insufficient to draw any conclusion

Answer:



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36. Identify the wrong statement in the following Coulomb's law correctly described the electric force that

A. binds the electrons of an atom to its nucleus

B. binds the protons and neutrons in the nucleus of an atom

C. binds atoms together to form molecules

D. binds atoms and molecules to form solids

Answer:



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