

JEE MAIN ELECTRIC CHARGES AND FIELDS — PYQS

Max. Marks: 232

Questions: 58

Section A (MCQ) — 42 questions

- Q.1** Two point charges $q_1 = 3 \mu\text{C}$ and $q_2 = -4 \mu\text{C}$ are placed at points $(2\hat{i} + 3\hat{j} + 3\hat{k})$ and $(\hat{i} + \hat{j} + \hat{k})$ respectively. Force on charge q_2 is _____ N. (Take

$$\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ SI Units})$$

[JEE Main 2026 (Online) 8th April Evening Shift]

- (1) $(12\hat{i} + 24\hat{j} + 24\hat{k}) \times 10^{-3}$
 (2) $(4\hat{i} + 8\hat{j} + 8\hat{k}) \times 10^{-3}$
 (3) $(3\hat{i} + 6\hat{j} + 6\hat{k}) \times 10^{-3}$
 (4) $(-4\hat{i} - 8\hat{j} - 8\hat{k}) \times 10^{-3}$

Scan or tap for the full solution



- Q.2** A thin half ring of radius 35 cm is uniformly charged with a total charge of Q coulomb. If the magnitude of the electric field at centre of the half ring is 100 V/m, then the value of Q is _____ nC. ($\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$ and $\pi = 3.14$)

[JEE Main 2026 (Online) 6th April Morning Shift]

- (1) 2.14 (2) 2.44 (3) 3.25 (4) 0.7

Scan or tap for the full solution



- Q.3** A rigid dipole undergoes a simple harmonic motion about its centre in the presence of an electric field $\vec{E}_1 = E_0\hat{x}$. If another electric field $\vec{E}_2 = 2E_0(\hat{y} + \hat{z})$ is introduced to the system, what will be the percentage change in the frequency of the oscillation (approximate)?

[JEE Main 2026 (Online) 4th April Evening Shift]

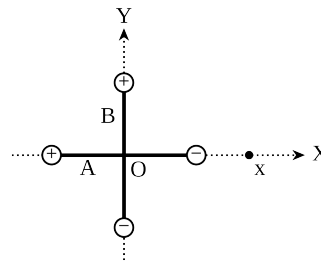
- (1) 73% (2) 63% (3) 83% (4) 53%

Scan or tap for the full solution



- Q.4** Two short electric dipoles **A** and **B** having dipole moment p_1 and p_2 respectively are placed with their axes mutually perpendicular as shown in the figure. The resultant electric field at a point x is making an angle of 60° with the line joining points O and x . The ratio of the dipole moments p_2/p_1 is _____.

[JEE Main 2026 (Online) 2nd April Morning Shift]



- (1) $\frac{\sqrt{3}}{2}$ (2) $2\sqrt{3}$ (3) $\frac{1}{\sqrt{3}}$ (4) $\sqrt{3}$

Scan or tap for the full solution



- Q.5** Two point charges $8 \mu\text{C}$ and $-2 \mu\text{C}$ are located at $x = 2 \text{ cm}$ and $x = 4 \text{ cm}$, respectively on the x -axis. The ratio of electric flux due to these charges through two spheres of radii 3 cm and 5 cm with their centers at the origin is _____.

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 4 : 1 (2) 3 : 4 (3) 4 : 3 (4) 4 : 5

Scan or tap for the full solution



- Q.6** Identify the **correct** statements :
 Choose the **correct** answer from the options given below :
 A. Electrostatic field lines form closed loops.
 B. The electric field lines point radially outward when charge is greater than zero.
 C. Gauss's law is valid only for inverse-square force.
 D. The work done in moving a charged particle in a static electric field around a closed path is zero.
 E. The motion of a particle under Coulomb's force must take place in a plane.

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) A, C, E Only (2) A, B, D, E Only
 (3) B, C, D, E Only (4) A, B, C, D Only

Scan or tap for the full solution



- Q.7** The electrostatic potential in a charged spherical region of radius r varies as $V = ar^3 + b$, where a and b are constants. The total charge in the sphere of unit radius is $\alpha \times \pi\epsilon_0$. The value of α is _____.

[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) -12 (2) -8 (3) -9 (4) -6

Scan or tap for the full solution



Q.8 Three charges $+2q$, $+3q$ and $-4q$ are situated at $(0, -3a)$, $(2a, 0)$ and $(-2a, 0)$ respectively in the xy plane. The resultant dipole moment about origin is _____.

[JEE Main 2026 (Online) 24th January Morning Shift]

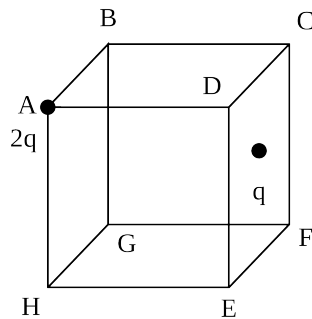
- (1) $2qa(7\hat{i} - 3\hat{j})$ (2) $2qa(3\hat{j} - 7\hat{i})$
(3) $2qa(3\hat{i} - 7\hat{j})$ (4) $2qa(3\hat{j} - \hat{i})$

Scan or tap for the full solution



Q.9 Two point charges $2q$ and q are placed at vertex A and centre of face CDEF of the cube as shown in figure. The electric flux passing through the cube is:

[JEE Main 2026 (Online) 23rd January Morning Shift]



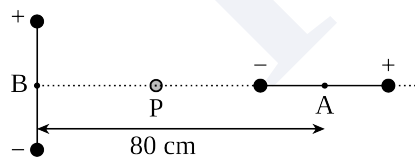
- (1) $\frac{3q}{2\epsilon_0}$ (2) $\frac{3q}{4\epsilon_0}$ (3) $\frac{q}{\epsilon_0}$ (4) $\frac{3q}{\epsilon_0}$

Scan or tap for the full solution



Q.10 Two short dipoles (A, B), A having charges $\pm 2 \mu\text{C}$ and length 1 cm and B having charges $\pm 4 \mu\text{C}$ and length 1 cm are placed with their centres 80 cm apart as shown in the figure. The electric field at a point P, equi-distant from the centres of both dipoles is _____ N/C.

[JEE Main 2026 (Online) 23rd January Evening Shift]



- (1) $\frac{9}{16}\sqrt{2} \times 10^5$ (2) $\frac{9}{16}\sqrt{2} \times 10^4$
(3) $9\sqrt{2} \times 10^4$ (4) $4.5\sqrt{2} \times 10^4$

Scan or tap for the full solution



Q.11 A simple pendulum has a bob with mass m and charge q . The pendulum string has negligible mass. When a uniform and horizontal electric field $\vec{E}$ is applied, the tension in the string changes. The final tension in the string, when pendulum attains an equilibrium position is _____.

[JEE Main 2026 (Online) 22nd January Morning Shift]

- (1) $mg - qE$ (2) $\sqrt{m^2g^2 + q^2E^2}$
(3) $mg + qE$ (4) $\sqrt{m^2g^2 - q^2E^2}$

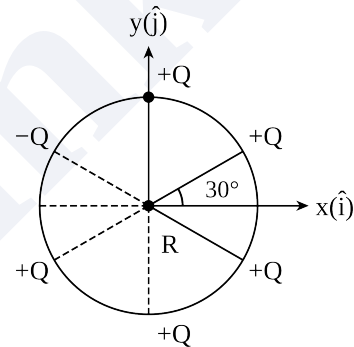
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Q.12 Six point charges are kept 60° apart from each other on the circumference of a circle of radius R as shown in figure. The net electric field at the center of the circle is _____.

(ϵ_0 is permittivity of free space)

[JEE Main 2026 (Online) 22nd January Morning Shift]



- (1) $-\left(\frac{5Q}{8\pi\epsilon_0 R^2}\right)(\hat{i} - 3\hat{j})$
(2) $\frac{Q}{4\pi\epsilon_0 R^2}(\sqrt{3}\hat{i} - \hat{j})$
(3) $-\frac{Q}{4\pi\epsilon_0 R^2}(\sqrt{3}\hat{i} - \hat{j})$
(4) $-\frac{5Q}{8\pi\epsilon_0 R^2}(\hat{i} + \sqrt{3}\hat{j})$

Scan or tap for the full solution



Q.13 An infinitely long wire has uniform linear charge density $\lambda = 2 \text{ nC/m}$. The net flux through a Gaussian cube of side length $\sqrt{3} \text{ cm}$, if the wire passes through any two corners of the cube, that are maximally displaced from each other, would be $x \text{ N m}^2 \text{ C}^{-1}$, where x is:

[Neglect any edge effects and use $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ SI units}$]

[JEE Main 2025 (Online) 8th April Evening Shift]

- (1) 6.48π (2) 0.72π (3) 1.44π (4) 2.16π

Scan or tap for the full solution



- Q.14** A dipole with two electric charges of $2\ \mu\text{C}$ magnitude each, with separation distance $0.5\ \mu\text{m}$, is placed between the plates of a capacitor such that its axis is parallel to an electric field established between the plates when a potential difference of $5\ \text{V}$ is applied. Separation between the plates is $0.5\ \text{mm}$. If the dipole is rotated by 30° from the axis, it tends to realign in the direction due to a torque. The value of torque is:

[JEE Main 2025 (Online) 7th April Evening Shift]

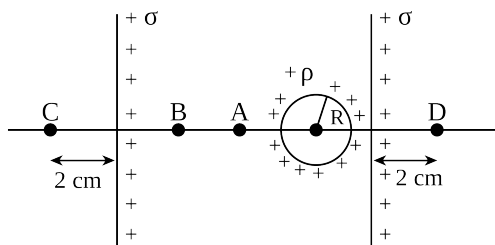
- (1) $2.5 \times 10^{-9}\ \text{Nm}$ (2) $2.5 \times 10^{-12}\ \text{Nm}$
(3) $5 \times 10^{-3}\ \text{Nm}$ (4) $5 \times 10^{-9}\ \text{Nm}$

Scan or tap for the full solution



- Q.15** Two infinite identical charged sheets and a charged spherical body of charge density ' ρ ' are arranged as shown in figure. Then the correct relation between the electrical fields at A, B, C and D points is:

[JEE Main 2025 (Online) 4th April Morning Shift]



- (1) $|\vec{E}_A| = |\vec{E}_B|$; $\vec{E}_C > \vec{E}_D$
(2) $\vec{E}_A = \vec{E}_B$; $\vec{E}_C = \vec{E}_D$
(3) $\vec{E}_C \neq \vec{E}_D$; $\vec{E}_A > \vec{E}_B$
(4) $\vec{E}_A > \vec{E}_B$; $\vec{E}_C = \vec{E}_D$

Scan or tap for the full solution



- Q.16** Two small spherical balls of mass $10\ \text{g}$ each with charges $-2\ \mu\text{C}$ and $2\ \mu\text{C}$, are attached to two ends of very light rigid rod of length $20\ \text{cm}$. The arrangement is now placed near an infinite non-conducting charge sheet with uniform charge density of $100\ \mu\text{C}/\text{m}^2$ such that length of rod makes an angle of 30° with electric field generated by charge sheet. Net torque acting on the rod is: (Take $\epsilon_0 = 8.85 \times 10^{-12}\ \text{C}^2/\text{Nm}^2$)

[JEE Main 2025 (Online) 4th April Morning Shift]

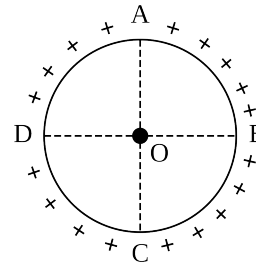
- (1) $1.12\ \text{Nm}$ (2) $2.24\ \text{Nm}$
(3) $11.2\ \text{Nm}$ (4) $112\ \text{Nm}$

Scan or tap for the full solution



- Q.17** A metallic ring is uniformly charged as shown in figure. AC and BD are two mutually perpendicular diameters. Electric field due to arc AB at 'O' is 'E' in magnitude. What would be the magnitude of electric field at 'O' due to arc ABC?

[JEE Main 2025 (Online) 4th April Evening Shift]



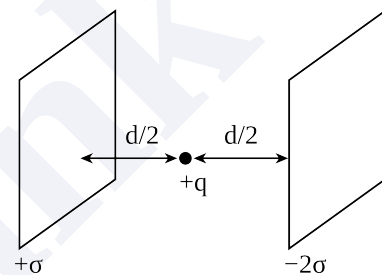
- (1) $2E$ (2) Zero (3) $E/2$ (4) $\sqrt{2}\ E$

Scan or tap for the full solution



- Q.18** Consider two infinitely large plane parallel conducting plates as shown below. The plates are uniformly charged with a surface charge density $+\sigma$ and -2σ . The force experienced by a point charge $+q$ placed at the mid point between two plates will be:

[JEE Main 2025 (Online) 2nd April Morning Shift]



- (1) $\frac{3\sigma q}{4\epsilon_0}$ (2) $\frac{3\sigma q}{2\epsilon_0}$ (3) $\frac{\sigma q}{4\epsilon_0}$ (4) $\frac{\sigma q}{2\epsilon_0}$

Scan or tap for the full solution



- Q.19** A point charge $+q$ is placed at the origin. A second point charge $+9q$ is placed at $(d, 0, 0)$ in Cartesian coordinate system. The point in between them where the electric field vanishes is:

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1) $(3d/4, 0, 0)$ (2) $(d/4, 0, 0)$
(3) $(4d/3, 0, 0)$ (4) $(d/3, 0, 0)$

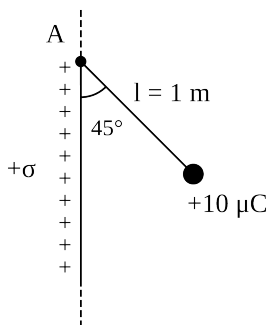
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- Q.20** A small bob of mass $100\ \text{mg}$ and charge $+10\ \mu\text{C}$ is connected to an insulating string of length $1\ \text{m}$. It is brought near to an infinitely long non-conducting sheet of charge density ' σ ' as shown in figure. If string subtends an angle of 45° with the sheet at equilibrium the charge density of sheet will be:

(Given, $\epsilon_0 = 8.85 \times 10^{-12}\ \frac{\text{F}}{\text{m}}$ and acceleration due to gravity, $g = 10\ \frac{\text{m}}{\text{s}^2}$)

[JEE Main 2025 (Online) 2nd April Morning Shift]



- (1) 1.77 nC/m^2 (2) 0.885 nC/m^2
 (3) 885 nC/m^2 (4) 17.7 nC/m^2

Scan or tap for the full solution



Q.21 Consider a circular loop that is uniformly charged and has a radius $a\sqrt{2}$. Find the position along the positive z-axis of the Cartesian coordinate system where the electric field is maximum if the ring was assumed to be placed in xy plane at the origin :

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) a (2) $a/2$ (3) 0 (4) $a/\sqrt{2}$

Scan or tap for the full solution



Q.22 An electric dipole of mass m, charge q, and length l is placed in a uniform electric field $\vec{E} = E_0 \hat{i}$. When the dipole is rotated slightly from its equilibrium position and released, the time period of its oscillations will be :

[JEE Main 2025 (Online) 29th January Morning Shift]

- (1) $\frac{1}{2\pi} \sqrt{\frac{ml}{2qE_0}}$ (2) $2\pi \sqrt{\frac{ml}{2qE_0}}$
 (3) $2\pi \sqrt{\frac{ml}{qE_0}}$ (4) $\frac{1}{2\pi} \sqrt{\frac{2ml}{qE_0}}$

Scan or tap for the full solution



Q.23 Match List - I with List - II.

List - I		List - II	
A.	Electric field inside (distance $r > 0$ from center) of a uniformly charged spherical shell with surface charge density σ , and radius R.	I.	σ/ϵ_0
B.	Electric field at distance $r > 0$ from a uniformly charged infinite plane sheet with surface charge density σ .	II.	$\sigma/2\epsilon_0$
C.	Electric field outside (distance $r > 0$ from center) of a uniformly charged spherical shell with surface charge density σ , and radius R.	III.	0

List - I		List - II	
D.	Electric field between 2 oppositely charged infinite plane parallel sheets with uniform surface charge density σ .	IV.	$\frac{\sigma R^2}{\epsilon_0 r^2}$

Choose the correct answer from the options given below :

[JEE Main 2025 (Online) 29th January Morning Shift]

- (1) (A)-(IV), (B)-(I), (C)-(III), (D)-(II)
 (2) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)
 (3) (A)-(III), (B)-(II), (C)-(IV), (D)-(I)
 (4) (A)-(IV), (B)-(II), (C)-(III), (D)-(I)

Scan or tap for the full solution



Q.24 A point charge causes an electric flux of $-2 \times 10^4 \text{ N m}^2 \text{ C}^{-1}$ to pass through a spherical Gaussian surface of 8.0 cm radius, centred on the charge. The value of the point charge is :
 (Given $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$)

[JEE Main 2025 (Online) 29th January Evening Shift]

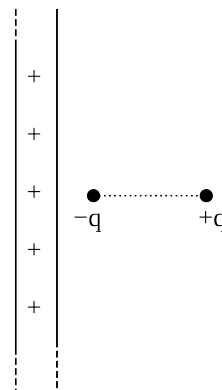
- (1) $17.7 \times 10^{-8} \text{ C}$ (2) $-17.7 \times 10^{-8} \text{ C}$
 (3) $15.7 \times 10^{-8} \text{ C}$ (4) $-15.7 \times 10^{-8} \text{ C}$

Scan or tap for the full solution



Q.25 An electric dipole is placed at a distance of 2 cm from an infinite plane sheet having positive charge density σ_0 . Choose the correct option from the following.

[JEE Main 2025 (Online) 29th January Evening Shift]



- (1) Torque on dipole is zero and net force is directed away from the sheet.
 (2) Potential energy of dipole is minimum and torque is zero.
 (3) Potential energy and torque both are maximum.
 (4) Torque on dipole is zero and net force acts towards the sheet.

Scan or tap for the full solution



- Q.26** A small uncharged conducting sphere is placed in contact with an identical sphere but having 4×10^{-8} C charge and then removed to a distance such that the force of repulsion between them is 9×10^{-3} N. The distance between them is (Take $\frac{1}{4\pi\epsilon_0}$ as 9×10^9 in SI units)

[JEE Main 2025 (Online) 24th January Evening Shift]

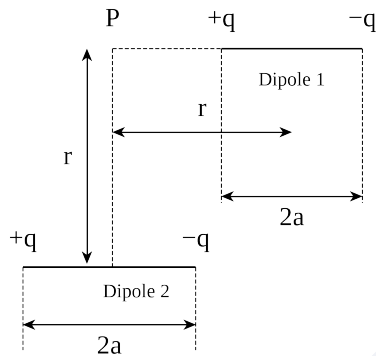
- (1) 1 cm (2) 2 cm (3) 4 cm (4) 3 cm

Scan or tap for the full solution



- Q.27** A point particle of charge Q is located at P along the axis of an electric dipole 1 at a distance r as shown in the figure. The point P is also on the equatorial plane of a second electric dipole 2 at a distance r . The dipoles are made of opposite charge q separated by a distance $2a$. For the charge particle at P not to experience any net force, which of the following correctly describes the situation?

[JEE Main 2025 (Online) 23rd January Morning Shift]



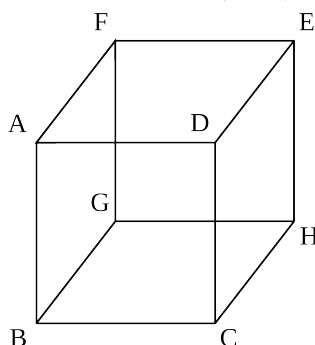
- (1) $\frac{a}{r} \sim 0.5$ (2) $\frac{a}{r} \sim 3$
 (3) $\frac{a}{r} \sim 10$ (4) $\frac{a}{r} \sim 20$

Scan or tap for the full solution



- Q.28** A line charge of length $\frac{a}{2}$ is kept at the center of an edge BC of a cube ABCDEFGH having edge length 'a' as shown in the figure. If the density of line charge is λ C per unit length, then the total electric flux through all the faces of the cube will be _____. (Take, ϵ_0 as the free space permittivity)

[JEE Main 2025 (Online) 22nd January Morning Shift]



- (1) $\frac{\lambda a}{2\epsilon_0}$ (2) $\frac{\lambda a}{8\epsilon_0}$ (3) $\frac{\lambda a}{4\epsilon_0}$ (4) $\frac{\lambda a}{16\epsilon_0}$

Scan or tap for the full solution



- Q.29** An electron is made to enter symmetrically between two parallel and equally but oppositely charged metal plates, each of 10 cm length. The electron emerges out of the electric field region with a horizontal component of velocity 10^6 m/s. If the magnitude of the electric field between the plates is 9.1 V/cm, then the vertical component of velocity of electron is (mass of electron = 9.1×10^{-31} kg and charge of electron = 1.6×10^{-19} C)

[JEE Main 2025 (Online) 22nd January Morning Shift]

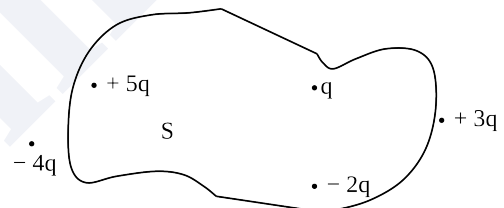
- (1) 1×10^6 m/s (2) 16×10^6 m/s
 (3) 16×10^4 m/s (4) 0

Scan or tap for the full solution



- Q.30** Five charges $+q$, $+5q$, $-2q$, $+3q$ and $-4q$ are situated as shown in the figure. The electric flux due to this configuration through the surface S is :

[JEE Main 2024 (Online) 9th April Evening Shift]



- (1) $\frac{q}{\epsilon_0}$ (2) $\frac{3q}{\epsilon_0}$ (3) $\frac{5q}{\epsilon_0}$ (4) $\frac{4q}{\epsilon_0}$

Scan or tap for the full solution



- Q.31** σ is the uniform surface charge density of a thin spherical shell of radius R . The electric field at any point on the surface of the spherical shell is :

[JEE Main 2024 (Online) 6th April Morning Shift]

- (1) $\sigma/\epsilon_0 R$ (2) σ/ϵ_0 (3) $\sigma/2\epsilon_0$ (4) $\sigma/4\epsilon_0$

Scan or tap for the full solution



- Q.32** Two identical conducting spheres P and S with charge Q on each, repel each other with a force 16 N. A third identical uncharged conducting sphere R is successively brought in contact with the two spheres. The new force of repulsion between P and S is : [JEE Main 2024 (Online) 6th April Evening Shift]

- (1) 1 N (2) 6 N (3) 12 N (4) 4 N

Scan or tap for the full solution



- Q.33** In hydrogen like system the ratio of coulombian force and gravitational force between an electron and a proton is in the order of :

[JEE Main 2024 (Online) 5th April Morning Shift]

- (1) 10^{19} (2) 10^{39} (3) 10^{29} (4) 10^{36}

Scan or tap for the full solution



Q.34 The vehicles carrying inflammable fluids usually have metallic chains touching the ground:

[JEE Main 2024 (Online) 5th April Evening Shift]

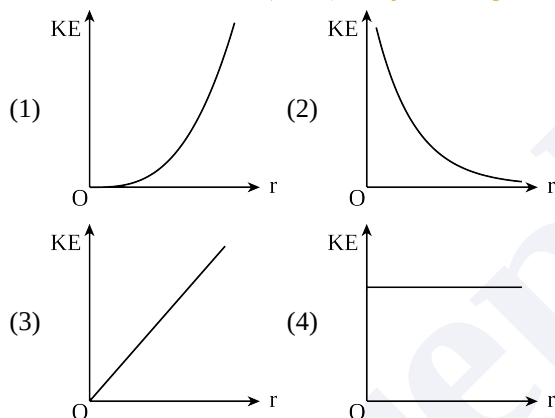
- (1) To protect tyres from catching dirt from ground
 (2) It is a custom
 (3) To alert other vehicles
 (4) To conduct excess charge due to air friction to ground and prevent sparking

Scan or tap for the full solution



Q.35 An infinitely long positively charged straight thread has a linear charge density $\lambda \text{ Cm}^{-1}$. An electron revolves along a circular path having axis along the length of the wire. The graph that correctly represents the variation of the kinetic energy of electron as a function of radius of circular path from the wire is :

[JEE Main 2024 (Online) 4th April Morning Shift]



Scan or tap for the full solution



Q.36 A charge q is placed at the center of one of the surfaces of a cube. The flux linked with the cube is:

[JEE Main 2024 (Online) 4th April Evening Shift]

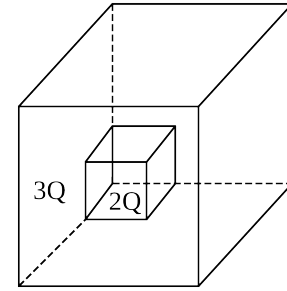
- (1) $\frac{q}{2\epsilon_0}$ (2) Zero (3) $\frac{q}{4\epsilon_0}$ (4) $\frac{q}{8\epsilon_0}$

Scan or tap for the full solution



Q.37 C_1 and C_2 are two hollow concentric cubes enclosing charges $2Q$ and $3Q$ respectively as shown in figure. The ratio of electric flux passing through C_1 and C_2 is :

[JEE Main 2024 (Online) 1st February Evening Shift]



- (1) 3:2 (2) 5:2 (3) 2:5 (4) 2:3

Scan or tap for the full solution



Q.38 Two charges q and $3q$ are separated by a distance ' r ' in air. At a distance x from charge q , the resultant electric field is zero. The value of x is :

[JEE Main 2024 (Online) 31st January Morning Shift]

- (1) $\frac{r}{3(1+\sqrt{3})}$ (2) $\frac{(1+\sqrt{3})}{r}$
 (3) $\frac{r}{(1+\sqrt{3})}$ (4) $r(1+\sqrt{3})$

Scan or tap for the full solution



Q.39 Force between two point charges q_1 and q_2 placed in vacuum at ' r ' cm apart is F . Force between them when placed in a medium having dielectric constant $K = 5$ at ' $r/5$ ' cm apart will be:

[JEE Main 2024 (Online) 31st January Evening Shift]

- (1) $5F$ (2) $25F$ (3) $F/5$ (4) $F/25$

Scan or tap for the full solution



Q.40 A particle of charge ' $-q$ ' and mass ' m ' moves in a circle of radius ' r ' around an infinitely long line charge of linear charge density ' $+\lambda$ '. Then time period will be given as :

(Consider k as Coulomb's constant)

[JEE Main 2024 (Online) 30th January Evening Shift]

- (1) $T^2 = \frac{4\pi^2 m}{2k\lambda q} r^3$ (2) $T = \frac{1}{2\pi r} \sqrt{\frac{m}{2k\lambda q}}$
 (3) $T = \frac{1}{2\pi} \sqrt{\frac{2k\lambda q}{m}}$ (4) $T = 2\pi r \sqrt{\frac{m}{2k\lambda q}}$

Scan or tap for the full solution



Q.41 Two charges of $5Q$ and $-2Q$ are situated at the points $(3a, 0)$ and $(-5a, 0)$ respectively. The electric flux through a sphere of radius ' $4a$ ' having center at origin is :

[JEE Main 2024 (Online) 29th January Morning Shift]

- (1) $\frac{2Q}{\epsilon_0}$ (2) $\frac{7Q}{\epsilon_0}$ (3) $\frac{3Q}{\epsilon_0}$ (4) $\frac{5Q}{\epsilon_0}$

Scan or tap for the full solution



- Q.42** An electric field is given by $(6\hat{i} + 5\hat{j} + 3\hat{k})$ N/C. The electric flux through a surface area $30\hat{i}$ m² lying in YZ-plane (in SI unit) is :

[JEE Main 2024 (Online) 29th January Evening Shift]

- (1) 60 (2) 90 (3) 180 (4) 150

Scan or tap for the full solution

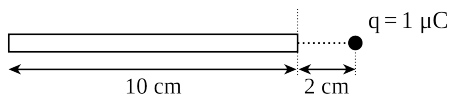


Section B (Numerical) — 16 questions

- Q.43** A point charge $q = 1 \mu\text{C}$ is located at a distance 2 cm from one end of a thin insulating wire of length 10 cm having a charge $Q = 24 \mu\text{C}$, distributed uniformly along its length, as shown in figure. Force between q and wire is _____ N.

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

[JEE Main 2026 (Online) 24th January Evening Shift]



Scan or tap for the full solution



- Q.44** The electric field in a region is given by $\vec{E} = (2\hat{i} + 4\hat{j} + 6\hat{k}) \times 10^3$ N/C. The flux of the field through a rectangular surface parallel to x-z plane is $6.0 \text{ Nm}^2\text{C}^{-1}$. The area of the surface is _____ cm².

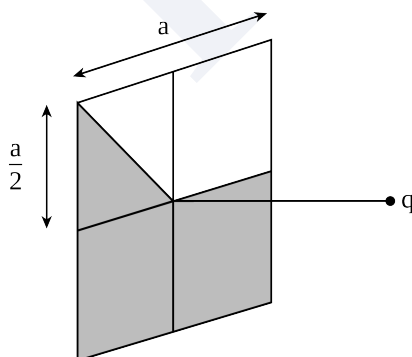
[JEE Main 2025 (Online) 7th April Evening Shift]

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- Q.45** A square loop of sides $a = 1$ m is held normally in front of a point charge $q = 1$ C at a distance $\frac{a}{2}$. The flux of the electric field through the shaded region is $\frac{5}{p} \times \frac{1}{\epsilon_0} \frac{\text{Nm}^2}{\text{C}}$, where the value of p is _____.

[JEE Main 2025 (Online) 24th January Morning Shift]



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- Q.46** A positive ion A and a negative ion B has charges 6.67×10^{-19} C and 9.6×10^{-10} C, and masses 19.2×10^{-27} kg and 9×10^{-27} kg respectively. At an instant, the ions are separated by a certain distance r . At that instant the ratio of the magnitudes of electrostatic force to gravitational force is $P \times 10^{-13}$, where the value of P is _____.

(Take $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2}$ and universal

gravitational constant as $6.67 \times 10^{-11} \text{ Nm}^2 \text{kg}^{-2}$)

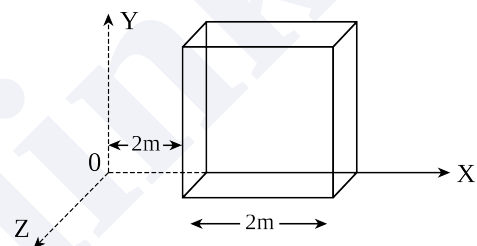
[JEE Main 2025 (Online) 23rd January Morning Shift]

Scan or tap for the full solution



- Q.47** An electric field $\vec{E} = (2x\hat{i}) \text{ NC}^{-1}$ exists in space. A cube of side 2 m is placed in the space as per figure given below. The electric flux through the cube is _____ Nm²/C.

[JEE Main 2024 (Online) 9th April Evening Shift]



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- Q.48** An electric field, $\vec{E} = \frac{2\hat{i} + 6\hat{j} + 8\hat{k}}{\sqrt{6}}$ passes through the surface of 4 m^2 area having unit vector $\hat{n} = \left(\frac{2\hat{i} + \hat{j} + \hat{k}}{\sqrt{6}} \right)$. The electric flux for that surface is _____ V m.

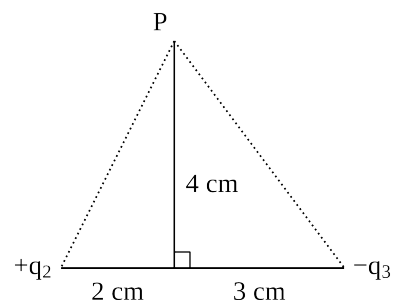
[JEE Main 2024 (Online) 8th April Morning Shift]

Scan or tap for the full solution



- Q.49** If the net electric field at point P along Y axis is zero, then the ratio of $\left| \frac{q_2}{q_3} \right|$ is $\frac{8}{5\sqrt{x}}$, where $x =$ _____.

[JEE Main 2024 (Online) 8th April Evening Shift]

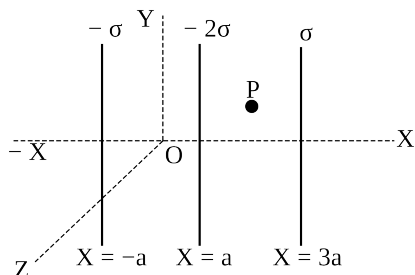


Scan or tap for the full solution



- Q.50** Three infinitely long charged thin sheets are placed as shown in figure. The magnitude of electric field at the point P is $\frac{x\sigma}{\epsilon_0}$. The value of x is _____ (all quantities are measured in SI units).

[JEE Main 2024 (Online) 6th April Morning Shift]

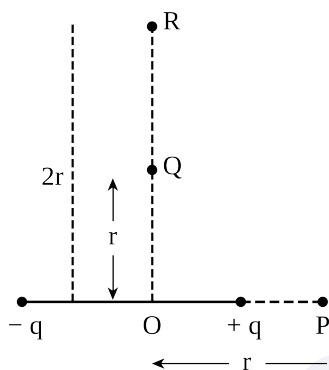


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- Q.51** The electric field at point P due to an electric dipole is E. The electric field at point R on equatorial line will be $\frac{E}{x}$. The value of x :

[JEE Main 2024 (Online) 5th April Evening Shift]



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- Q.52** An infinite plane sheet of charge having uniform surface charge density $+\sigma_s$ C/m² is placed on x-y plane. Another infinitely long line charge having uniform linear charge density $+\lambda_e$ C/m is placed at $z = 4$ m plane and parallel to y-axis. If the magnitude values $|\sigma_s| = 2|\lambda_e|$ then at point (0,0,2), the ratio of magnitudes of electric field values due to sheet charge to that of line charge is $\pi\sqrt{n} : 1$. The value of n is _____.

[JEE Main 2024 (Online) 4th April Morning Shift]

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- Q.53** Two identical charged spheres are suspended by strings of equal lengths. The strings make an angle θ with each other. When suspended in water the angle remains the same. If density of the material of the sphere is 1.5 g/cc, the dielectric constant of water will be _____.

(Take density of water = 1 g/cc)

[JEE Main 2024 (Online) 1st February Morning Shift]

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- Q.54** Suppose a uniformly charged wall provides a uniform electric field of 2×10^4 N/C normally. A charged particle of mass 2 g being suspended through a silk thread of length 20 cm and remain stayed at a distance of 10 cm from the wall.

Then the charge on the particle will be $\frac{1}{\sqrt{x}}$ μC

where $x = \text{_____}$. [use $g = 10 \text{ m/s}^2$]

[JEE Main 2024 (Online) 1st February Evening Shift]

Scan or tap for the full solution



- Q.55** Two identical charged spheres are suspended by strings of equal lengths. The strings make an angle of 37° with each other. When suspended in a liquid of density 0.7 g/cm^3 , the angle remains same. If density of material of the sphere is 1.4 g/cm^3 , the dielectric constant of the liquid is _____
 $\left(\tan 37^\circ = \frac{3}{4}\right)$

[JEE Main 2024 (Online) 30th January Evening Shift]

Scan or tap for the full solution



- Q.56** An electron is moving under the influence of the electric field of a uniformly charged infinite plane sheet S having surface charge density $+\sigma$. The electron at $t = 0$ is at a distance of 1 m from S and has a speed of 1 m/s. The maximum value of σ if the electron strikes S at $t = 1 \text{ s}$ is $\alpha \left[\frac{m\epsilon_0}{e} \right] \frac{\text{C}}{\text{m}^2}$, the value of α is _____.

[JEE Main 2024 (Online) 29th January Morning Shift]

Scan or tap for the full solution



- Q.57** A thin metallic wire having cross sectional area of 10^{-4} m^2 is used to make a ring of radius 30 cm. A positive charge of $2\pi \text{ C}$ is uniformly distributed over the ring, while another positive charge of 30 pC is kept at the centre of the ring. The tension in the ring is _____ N; provided that the ring does not get deformed (neglect the influence of gravity). (given, $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ SI units}$)

[JEE Main 2024 (Online) 27th January Morning Shift]

Scan or tap for the full solution



- Q.58** Two charges of $-4 \mu\text{C}$ and $+4 \mu\text{C}$ are placed at the points $A(1, 0, 4) \text{ m}$ and $B(2, -1, 5) \text{ m}$ located in an electric field $\vec{E} = 0.20\hat{i} \text{ V/cm}$. The magnitude of the torque acting on the dipole is $8\sqrt{\alpha} \times 10^{-5} \text{ Nm}$, where $\alpha = \underline{\hspace{1cm}}$.

[JEE Main 2024 (Online) 27th January Evening Shift]

Scan or tap for the full solution



ANSWER KEY

Section A (MCQ) — 42 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	1	1	2	3	3	1	1	2	2	2
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	3	4	4	3	1	4	2	2	1	1	2
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	3	2	2	2	2	2	2	4	2	2	2
Ques.	34	35	36	37	38	39	40	41	42		
Ans.	4	4	1	3	3	1	4	4	3		

Section B (Numerical) — 16 questions

Ques.	43	44	45	46	47
Ans.	90	15	48	BONUS	16
Ques.	48	49	50	51	52
Ans.	12	5	2	16	16
Ques.	53	54	55	56	57
Ans.	3	3	2	8	3
Ques.	58				
Ans.	2				