

## JEE MAIN ELECTRIC CHARGES AND FIELDS — PYQS

Max. Marks: 100

Questions: 25

### Section A (MCQ) — 23 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]

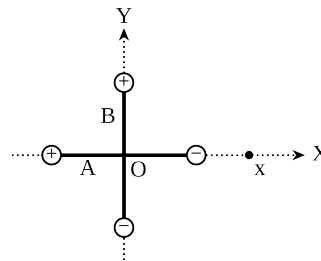
- (1) 73%      (2) 63%      (3) 83%      (4) 53%

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  $60^\circ$  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  $\alpha$  is \_\_\_\_\_.

(permittivity of vacuum is  $\epsilon_0$ )

[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]

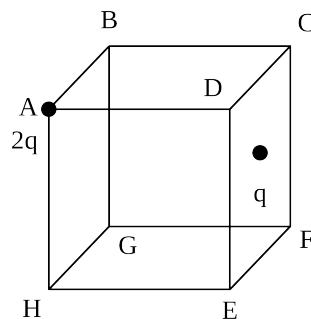
- (1)  $2qa(7\hat{i} - 3\hat{j})$       (2)  $2qa(3\hat{j} - 7\hat{i})$   
 (3)  $2qa(3\hat{i} - 7\hat{j})$       (4)  $2qa(3\hat{j} - \hat{i})$

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]



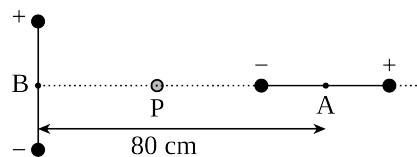
- (1)  $\frac{3q}{2\epsilon_0}$       (2)  $\frac{3q}{4\epsilon_0}$       (3)  $\frac{q}{\epsilon_0}$       (4)  $\frac{3q}{\epsilon_0}$

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]

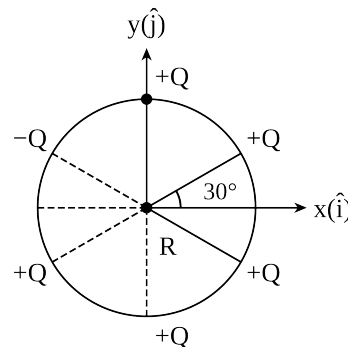
- (1)  $mg - qE$       (2)  $\sqrt{m^2g^2 + q^2E^2}$   
 (3)  $mg + qE$       (4)  $\sqrt{m^2g^2 - q^2E^2}$

Scan or tap for the full solution



**Q.12** Six point charges are kept  $60^\circ$  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 \_\_\_\_\_. ( $\epsilon_0$  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)  $6.48\pi$       (2)  $0.72\pi$       (3)  $1.44\pi$       (4)  $2.16\pi$

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  $30^\circ$  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]

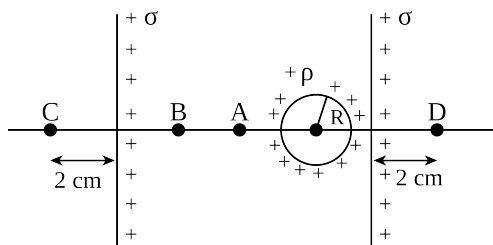
- (1)  $2.5 \times 10^{-9}\ \text{Nm}$  (2)  $2.5 \times 10^{-12}\ \text{Nm}$   
(3)  $5 \times 10^{-3}\ \text{Nm}$  (4)  $5 \times 10^{-9}\ \text{Nm}$

Scan or tap for the full solution



- Q.15** Two infinite identical charged sheets and a charged spherical body of charge density ' $\rho$ ' 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  $30^\circ$  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]

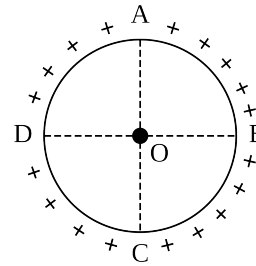
- (1)  $1.12\ \text{Nm}$  (2)  $2.24\ \text{Nm}$   
(3)  $11.2\ \text{Nm}$  (4)  $112\ \text{Nm}$

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]



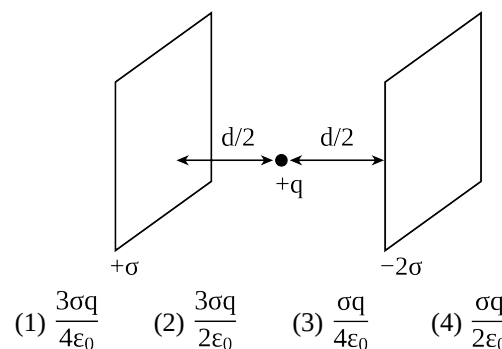
- (1)  $2E$  (2) Zero (3)  $E/2$  (4)  $\sqrt{2}\ E$

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  $-2\sigma$ . 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]

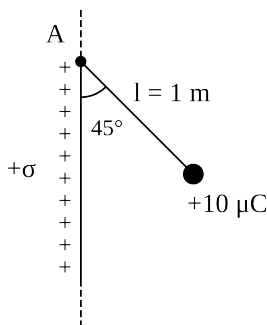
- (1)  $(3d/4, 0, 0)$  (2)  $(d/4, 0, 0)$   
(3)  $(4d/3, 0, 0)$  (4)  $(d/3, 0, 0)$

Scan or tap for the full solution



- 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 ' $\sigma$ ' as shown in figure. If string subtends an angle of  $45^\circ$  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)  $1.77 \text{ nC/m}^2$       (2)  $0.885 \text{ nC/m}^2$   
 (3)  $885 \text{ nC/m}^2$       (4)  $17.7 \text{ nC/m}^2$

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

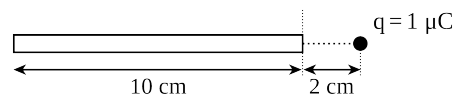


### Section B (Numerical) — 2 questions

**Q.24** 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.25** The electric field in a region is given by  $\vec{E} = (2\hat{i} + 4\hat{j} + 6\hat{k}) \times 10^3 \text{ N/C}$ . 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 \_\_\_\_\_  $\text{cm}^2$ .

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

Scan or tap for the full solution



## ANSWER KEY

### Section A (MCQ) — 23 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 |    |    |    |    |    |    |    |    |    |    |
| Ans.  | 3  |    |    |    |    |    |    |    |    |    |    |

### Section B (Numerical) — 2 questions

| Ques. | 24 | 25 |  |  |  |  |  |  |  |  |  |
|-------|----|----|--|--|--|--|--|--|--|--|--|
| Ans.  | 90 | 15 |  |  |  |  |  |  |  |  |  |