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NEET ELECTRIC CHARGES AND FIELDS — PYQS

Max. Marks: 140 **Questions:** 35

Section A (MCQ) — 35 questions

Q.1 An electric dipole with dipole moment 5×10^{-6} Cm is aligned with the direction of a uniform electric field of magnitude 4×10^{5} N/C. The dipole is then rotated through an angle of 60° with respect to the electric field. The change in the potential energy of the dipole is: [NEET (UG) 2025]

(1) 1.2 J (2) 1.5 J (3) 0.8 J (4) 1.0 J

Scan or tap for the full solution

Q.2 Two identical charged conducting spheres A and B have their centres separated by a certain distance. Charge on each sphere is q and the force of repulsion between them is F. A third identical uncharged conducting sphere is brought in contact with sphere A first and then with B and finally removed from both. New force of repulsion between spheres A and B (Radii of A and B are negligible compared to the distance of separation so that for calculating force between them they can be considered as point charges) is best given as: [NEET (UG) 2025]

(1) $\frac{F}{2}$ (2) $\frac{3F}{8}$ (3) $\frac{3F}{5}$ (4) $\frac{2F}{3}$

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Q.3 A metal cube of side 5 cm is charged with 6 μC. The surface charge density on the cube is [RE-NEET (UG) 2024]

(1) 0.125×10^{-3} C m^{-2} (2) 0.25×10^{-3} C m^{-2}
(3) 4×10^{-3} C m^{-2} (4) 0.4×10^{-3} C m^{-2}

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Q.4 An electric dipole is placed at an angle of 30° with an electric field of intensity 2×10^{5} N C^{-1}. It experiences a torque equal to 4 N m. Calculate the magnitude of charge on the dipole, if the dipole length is 2 cm. [NEET (UG) 2023]

(1) 6 mC (2) 4 mC (3) 2 mC (4) 8 mC

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Q.5 If $\oint_s \vec{E} \cdot d\vec{S} = 0$ over a surface, then: [NEET (UG) 2023]

(1) the magnitude of electric field on the surface is constant.
(2) all the charges must necessarily be inside the surface.
(3) the electric field inside the surface is necessarily uniform.
(4) the number of flux lines entering the surface must be equal to the number of flux lines leaving it.

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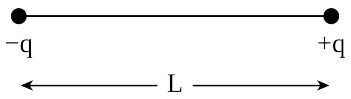
Q.6 Two point charges −q and +q are placed at a distance of L, as shown in the figure.



The magnitude of electric field intensity at a distance R (R > > L) varies as: [NEET (UG) 2022]

(1) $\frac{1}{R^2}$ (2) $\frac{1}{R^3}$ (3) $\frac{1}{R^4}$ (4) $\frac{1}{R^6}$

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Q.7 The ratio of Coulomb's electrostatic force to the gravitational force between an electron and a proton separated by some distance is 2.4×10^{39}. The ratio of the proportionality constant, $K = \frac{1}{4\pi\varepsilon_0}$ to the gravitational constant G is nearly (Given that the charge of the proton and electron each $= 1.6 \times 10^{-19}$ C, the mass of the electron $= 9.11 \times 10^{-31}$ kg, the mass of the proton $= 1.67 \times 10^{-27}$ kg) : [NEET (UG) 2022 (Phase 2)]

(1) 10 (2) 10^{20} (3) 10^{30} (4) 10^{40}

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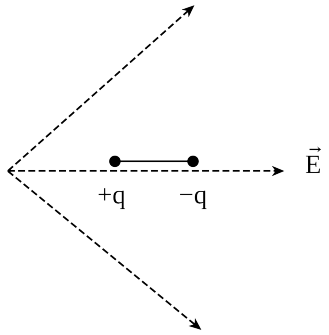
Q.8 A dipole is placed in an electric field as shown. In which direction will it move? [NEET (UG) 2021]



(1) towards the right as its potential energy will increase.

(2) towards the left as its potential energy will increase.

(3) towards the right as its potential energy will decrease.

(4) towards the left as its potential energy will decrease.

Scan or tap for the full solution

Q.9 A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere?

$\left(\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2\right)$ [NEET (UG) 2020]

(1) 1.28×10^5 N/C (2) 1.28×10^6 N/C

(3) 1.28×10^7 N/C (4) 1.28×10^4 N/C

Scan or tap for the full solution

Q.10 A hollow metal sphere of radius R is uniformly charged. The electric field due to the sphere at a distance r from the centre : [NEET (UG) 2019]

(1) zero as r increases for r < R, decreases as r increases for r > R

(2) zero as r increases for r < R, increases as r increases for r > R.

(3) decreases as r increases for r < R and for r > R.

(4) increases as r increases for r < R and for r > R.

Scan or tap for the full solution

Q.11 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 : [NEET (UG) 2019]

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

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Q.12 Two parallel infinite line charges with linear charge densities +λ C/m and −λ C/m are placed at a distance of 2R in free space. What is the electric field mid-way between the two line charges? [NEET (UG) 2019]

(1) $\frac{2\lambda}{\pi\varepsilon_0 R}$ N/C (2) zero

(3) $\frac{\lambda}{\pi\varepsilon_0 R}$ N/C (4) $\frac{\lambda}{2\pi\varepsilon_0 R}$ N/C

Scan or tap for the full solution

Q.13 An electron falls from rest through a vertical distance h in a uniform and vertically upward directed electric field E. The direction of electric field is now reversed, keeping its magnitude the same. A proton is allowed to fall from rest in it through the same vertical distance h. The time of fall of the electron, in comparison to the time of fall of the proton is [NEET 2018]

(1) smaller (2) 5 times greater

(3) 10 times greater (4) equal

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Q.14 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] [NEET 2017]

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

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Q.15 Two identical charged spheres suspended from a common point by two massless strings of lengths l, are initially at a distance d ($d \ll l$) 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 spheres, as [NEET 2016 (Phase 1)]

(1) v $x^{-1/2}$ (2) v x^{-1} (3) v $x^{1/2}$ (4) v x

Scan or tap for the full solution

Q.16 An electric dipole is placed at an angle of 30° with an electric field intensity 2×10^5 N C^{-1}. It experiences a torque equal to 4 N m. The charge on the dipole, if the dipole length is 2 cm, is [NEET 2016 (Phase 2)]

(1) 8 mC (2) 2 mC (3) 5 mC (4) 7 μC

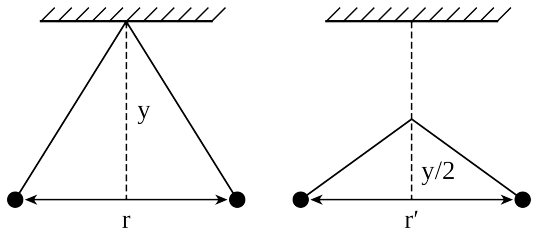
Scan or tap for the full solution

Q.17 The electric field in a certain region is acting radially outward and is given by E = Ar. A charge contained in a sphere of radius 'a' centred at the origin of the field, will be given by [AIPMT 2015 (Cancelled)]

(1) $4\pi\varepsilon_0 Aa^3$ (2) $\varepsilon_0 Aa^3$ (3) $4\pi\varepsilon_0 Aa^2$ (4) $A\varepsilon_0 a^2$

Scan or tap for the full solution

Q.18 Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is r. Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now becomes [NEET 2013]



(1) $\left(\frac{2r}{\sqrt{3}}\right)$ (2) $\left(\frac{2r}{3}\right)$

(3) $\left(\frac{1}{\sqrt{2}}\right)^2 r$ (4) $\left(\frac{r}{\sqrt[3]{2}}\right)$

Scan or tap for the full solution

Q.19 A charge q is placed at the centre of the line joining two equal charges Q. The system of the three charges will be in equilibrium if q is equal to [NEET 2013 (Karnataka)]

(1) −Q/4 (2) Q/4 (3) −Q/2 (4) Q/2

Scan or tap for the full solution

Q.20 What is the flux through a cube of side a if a point charge of q is at one of its corners? [AIPMT 2012 (Prelims)]

(1) $\frac{2q}{\varepsilon_0}$ (2) $\frac{q}{8\varepsilon_0}$ (3) $\frac{q}{\varepsilon_0}$ (4) $\frac{q}{2\varepsilon_0}6a^2$

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Q.21 A charge Q is enclosed by a Gaussian spherical surface of radius R. If the radius is doubled, then the outward electric flux will [AIPMT 2011 (Prelims)]

(1) increase four times (2) be reduced to half

(3) remain the same (4) be doubled

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Q.22 The electric field at a distance $\frac{3R}{2}$ from the centre of a charged conducting spherical shell of radius R is E. The electric field at a distance $\frac{R}{2}$ from the centre of the sphere is [AIPMT 2010 (Mains)]

(1) zero (2) E (3) $\frac{E}{2}$ (4) $\frac{E}{3}$

Scan or tap for the full solution

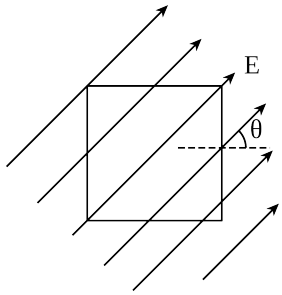
Q.23 Two positive ions, each carrying a charge q, are separated by a distance d. If F is the force of repulsion between the ions, the number of electrons missing from each ion will be (e being the charge on an electron) [AIPMT 2010 (Prelims)]

(1) $\frac{4\pi\varepsilon_0 Fd^2}{e^2}$ (2) $\sqrt{\frac{4\pi\varepsilon_0 Fe^2}{d^2}}$

(3) $\sqrt{\frac{4\pi\varepsilon_0 Fd^2}{e^2}}$ (4) $\frac{4\pi\varepsilon_0 Fd^2}{q^2}$

Scan or tap for the full solution

Q.24 A square surface of side L meter in the plane of the paper is placed in a uniform electric field E (volt/m) acting along the same plane at an angle θ with the horizontal side of the square as shown in figure.



The electric flux linked to the surface, in units of volt m is [AIPMT 2010 (Prelims)]

(1) EL^2 (2) $EL^2\cos\theta$

(3) $EL^2\sin\theta$ (4) zero

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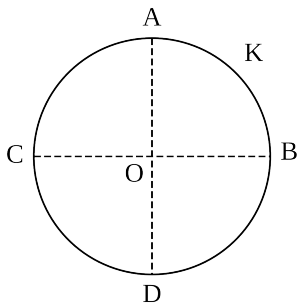
Q.25 A thin conducting ring of radius R is given a charge +Q. The electric field at the centre O of the ring due to the charge on the part AKB of the ring is E. The electric field at the centre due to the charge on the part ACDB of the ring is [AIPMT 2008]



(1) E along KO (2) 3E along OK
(3) 3E along KO (4) E along OK

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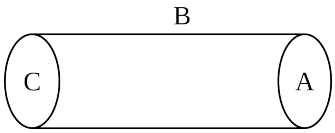
Q.26 A hollow cylinder has a charge q coulomb within it. If φ is the electric flux in units of volt-metre associated with the curved surface B, the flux linked with the plane surface A in units of V-m will be [AIPMT 2007]



(1) $\frac{q}{2\varepsilon_0}$ (2) $\frac{\phi}{3}$
(3) $\frac{q}{\varepsilon_0}-\phi$ (4) $\frac{1}{2}\left(\frac{q}{\varepsilon_0}-\phi\right)$

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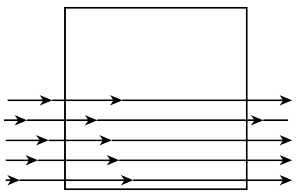
Q.27 Three point charges +q, −2q and + q are placed at points (x = 0, y = a, z = 0), (x = 0, y = 0, z = 0) and (x = a, y = 0, z = 0) respectively. The magnitude and direction of the electric dipole moment vector of this charge assembly are [AIPMT 2007]

(1) $\sqrt{2}qa$ along the line joining points (x = 0, y = 0, z = 0) and (x = a, y = a, z = 0)
(2) qa along the line joining points (x = 0, y = 0, z = 0) and (x = a, y = a, z = 0)
(3) $\sqrt{2}qa$ along +x direction
(4) $\sqrt{2}qa$ along +y direction

Scan or tap for the full solution

Q.28 A square surface of side L metres is in the plane of the paper. A uniform electric field $\vec{E}$ (volt/m), also in the plane of the paper is limited only to the lower half of the square surface (see figure). The electric flux in SI units associated with the surface is [AIPMT 2006]



(1) EL^2 (2) $EL^2/2\varepsilon_0$ (3) $EL^2/2$ (4) zero

Scan or tap for the full solution

Q.29 The unit of permittivity of free space, ε_0, is [AIPMT 2004]

(1) coulomb/newton-metre
(2) newton-metre^2/coulomb^2
(3) coulomb^2/newton-metre^2
(4) coulomb^2/(newton-metre)^2

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Q.30 A charge q is located at the centre of a cube. The electric flux through any face is [AIPMT 2003]

(1) $\frac{2\pi q}{6(4\pi\varepsilon_0)}$ (2) $\frac{4\pi q}{6(4\pi\varepsilon_0)}$
(3) $\frac{\pi q}{6(4\pi\varepsilon_0)}$ (4) $\frac{q}{6(4\pi\varepsilon_0)}$

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Q.31 An electron is moving round the nucleus of a hydrogen atom in a circular orbit of radius r. The Coulomb force $\vec{F}$ between the two is [AIPMT 2003]

(1) $K\frac{e^2}{r^2}\hat{r}$ (2) $-K\frac{e^2}{r^3}\hat{r}$ (3) $K\frac{e^2}{r^3}\hat{r}$ (4) $-K\frac{e^2}{r^2}\hat{r}$

Scan or tap for the full solution

Q.32 A dipole of dipole moment $\vec{p}$ is placed in uniform electric field $\vec{E}$ then torque acting on it is given by [AIPMT 2001]

(1) $\vec{\tau}=\vec{p}\cdot\vec{E}$ (2) $\vec{\tau}=\vec{p}\times\vec{E}$
(3) $\vec{\tau}=\vec{p}+\vec{E}$ (4) $\vec{\tau}=\vec{p}-\vec{E}$

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Q.33 A charge Q μC is placed at the centre of a cube, the flux coming out from each face will be [AIPMT 2001]

(1) $\frac{Q}{6\varepsilon_0}\times10^{-6}$ (2) $\frac{Q}{6\varepsilon_0}\times10^{-3}$
(3) $\frac{Q}{24\varepsilon_0}$ (4) $\frac{Q}{8\varepsilon_0}$

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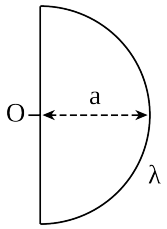
Q.34 A charge Q is situated at the corner of a cube, the electric flux passed through all the six faces of the cube is [AIPMT 2000]

(1) $\frac{Q}{6\varepsilon_0}$ (2) $\frac{Q}{8\varepsilon_0}$ (3) $\frac{Q}{\varepsilon_0}$ (4) $\frac{Q}{2\varepsilon_0}$

Scan or tap for the full solution

Q.35 Electric field at centre O of semicircle of radius a having linear charge density λ is given as [AIPMT 2000]



(1) $\frac{2\lambda}{\varepsilon_0 a}$ (2) $\frac{\lambda\pi}{\varepsilon_0 a}$ (3) $\frac{\lambda}{2\pi\varepsilon_0 a}$ (4) $\frac{\lambda}{\pi\varepsilon_0 a}$

Scan or tap for the full solution

ANSWER KEY

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