CHAPTER

08 Electrostatics

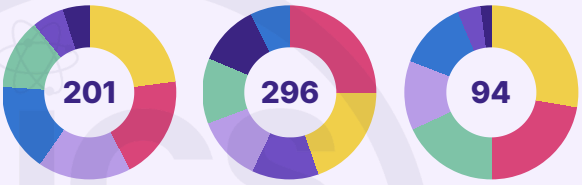
MHT CET · JEE · NEET Physics

PHYSICS CIRCLE

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EXAM WEIGHTAGE



	CET	JEE	NEET
Electric Flux & Gauss's Law	39 19%	74 25%	21 22%
Electric Potential & Equipotentials	46 23%	58 20%	26 28%
Electric Charge & Coulomb's Law	35 17%	36 12%	12 13%
Electric Dipole	26 13%	36 12%	17 18%
Electrostatic Potential Energy	33 16%	22 7%	12 13%
Electric Field & Field Lines	12 6%	37 12%	4 4%
Motion of Charges in an Electric Field	10 5%	33 11%	2 2%

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01 CONCEPT Electric Charge & Coulomb's Law

IN ONE LINE

Charge comes in whole-number packets of e; two point charges push or pull each other with a force that falls as the square of the distance.

8.1.1 Properties of charge

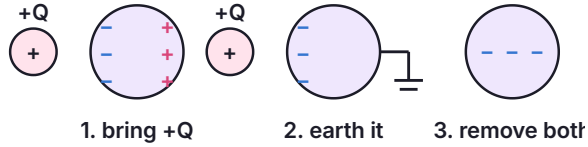
- Like charges repel; unlike charges attract.
- **Quantised**: Q = ±ne, n = 1, 2, 3 ...; e = 1.6 × 10^{-19} C.
- **Conserved**: it can be moved from one body to another, never created or destroyed.
- **Invariant**: it does not depend on speed (mass does).
- Charging changes mass a little: losing electrons makes a body positive and lighter.

$$n = \frac{Q}{e}$$

- SI unit: coulomb (C) = A s. Dimension: [AT].
- 1 C = 3 × 10^{9} statcoulomb (esu).
- A charge of ±⅔e or 1.5e is impossible on any body.

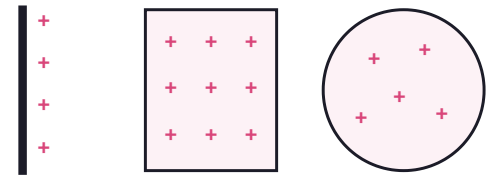
8.1.2 Methods of charging

- **Friction**: rubbing transfers electrons. Glass with silk: glass +, silk −. Ebonite or polythene with wool: ebonite −, wool +.
- **Conduction**: touching a charged body; both get the same sign.
- **Induction**: a nearby charge separates charges; earth the far side, then remove the earth and the charge. The body gets the opposite sign.



Charging by induction gives the opposite sign

8.1.3 Charge densities



Line, surface and volume distributions

Distribution	Density	SI unit
line	$\lambda = \frac{Q}{L}$	C m^{-1}
surface	$\sigma = \frac{Q}{A}$	C m^{-2}
volume	$\rho = \frac{Q}{V}$	C m^{-3}

- Sphere of radius r: $\sigma = \frac{Q}{4\pi r^2}$, so for the same charge $\sigma \propto \frac{1}{r^2}$.
- On a conductor σ is largest where the surface is most curved (sharp points), so charge leaks from points.

8.1.4 Coulomb's law



Equal and opposite forces along the line joining the charges

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2} = k\frac{q_1 q_2}{r^2}$$

- k = 9 × 10^{9} N m^2 C^{-2}; ε_0 = 8.85 × 10^{-12} C^2 N^{-1} m^{-2}.
- Valid for point charges at rest; $F_{12} = -F_{21}$ (Newton's third law).
- Doubling one charge and halving r makes F eight times.
- Electric force between electron and proton is about 10^{39} times the gravitational force.

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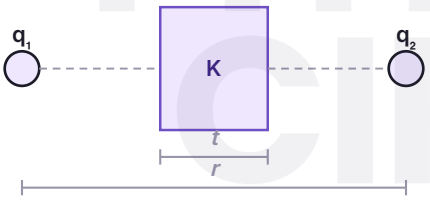
8.1.5 Touching identical spheres

- Two identical conductors in contact share the total charge equally: each gets $\frac{q_1 + q_2}{2}$.
- Opposite charges first cancel, then the rest is shared.
- Charge Q split into q and Q − q: the force is largest when $q = \frac{Q}{2}$.

8.1.6 Effect of a medium

$$F_m = \frac{F}{K} = \frac{1}{4\pi\varepsilon_0 K}\frac{q_1 q_2}{r^2}$$

- K = dielectric constant (relative permittivity), $\varepsilon = \varepsilon_0 K$.
- Same force in a medium as in air at distance r: the medium distance is $\frac{r}{\sqrt{K}}$.
- Same force in air as in the medium at distance d: the air distance is $d\sqrt{K}$.



Slab of thickness t between the charges

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{(r - t + t\sqrt{K})^2}$$

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Solved Examples 01 Electric Charge & Coulomb's Law

SOLVED 1 MHT CET 2021 · 21 Sep · Shift 2

When a piece of polythene is rubbed with wool, a negative charge of 4×10^{-7} C is developed on the polythene. The number of electrons transferred from wool to polythene is ($e = 1.6 \times 10^{-19}$ C)

(a) 1.5×10^{12} (b) 3.5×10^{13}
(c) 2.5×10^{13} (d) 2.5×10^{12}

STEP 1 Charge is quantised: $q = ne$
STEP 2 $n = \dfrac{4 \times 10^{-7}}{1.6 \times 10^{-19}}$
STEP 3 $n = \mathbf{2.5 \times 10^{12}}$

Answer: **(d)**

SOLVED 2 MHT CET 2021 · 23 Sep · Shift 2

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 = electronic charge, ε_0 = permittivity of free space)

(a) $\sqrt{\dfrac{4\pi\varepsilon_0 d^2}{e^2}}$ (b) $\sqrt{\dfrac{4\pi\varepsilon_0 Fd}{e^2}}$
(c) $\sqrt{\dfrac{4\pi\varepsilon_0 Fd^2}{e}}$ (d) $\sqrt{\dfrac{4\pi\varepsilon_0 Fd^2}{e^2}}$

STEP 1 $F = \dfrac{q^2}{4\pi\varepsilon_0 d^2} \Rightarrow q = \sqrt{4\pi\varepsilon_0 Fd^2}$
STEP 2 Each ion has lost n electrons: $q = ne$
STEP 3 $n = \sqrt{\dfrac{4\pi\varepsilon_0 Fd^2}{e^2}}$

Answer: **(d)**

SOLVED 3 MHT CET 2026 · 16 Apr · Shift 2

Two hollow spheres of radii R_1 and R_2 are charged with the same charge. If σ_1 and σ_2 are their surface charge densities, the ratio $\sigma_1 : \sigma_2$ is

(a) $R_1 : R_2$ (b) $R_2 : R_1$
(c) $R_2^2 : R_1^2$ (d) $R_1^2 : R_2^2$

STEP 1 $\sigma = \dfrac{Q}{4\pi R^2}$; same Q $\Rightarrow \sigma \propto \dfrac{1}{R^2}$
STEP 2 $\dfrac{\sigma_1}{\sigma_2} = \dfrac{R_2^2}{R_1^2}$
STEP 3 $\sigma_1 : \sigma_2 = \mathbf{R_2^2 : R_1^2}$

Answer: **(c)**

SOLVED 4 MHT CET 2021 · 21 Sep · Shift 1

F is the force between two identical charged particles placed at a distance Y from each other. If the distance between the charges is reduced to half the previous distance, the force between them becomes

(a) $\dfrac{F}{4}$ (b) 4F
(c) 2F (d) $\dfrac{F}{2}$

STEP 1 $F \propto \dfrac{1}{r^2}$
STEP 2 $r \to \dfrac{r}{2}$ multiplies F by 2^2
STEP 3 $F' = \mathbf{4F}$

Answer: **(b)**

SOLVED 5 MHT CET 2026 · 20 Apr · Shift 1

Two point charges q_1 and q_2 are l distance apart. If one of the charges is doubled and the distance between them is halved, the magnitude of the force becomes n times, where n is

(a) 2 (b) 4
(c) 8 (d) 16

STEP 1 $F \propto \dfrac{q_1 q_2}{r^2}$
STEP 2 Doubling one charge: × 2; halving r: × 4
STEP 3 $n = 2 \times 4 = \mathbf{8}$

Answer: **(c)**

SOLVED 6 MHT CET 2024 · 15 May · Shift 2

Two point charges $+q_1$ and $+q_2$ repel each other with a force of 100 N. q_1 is increased by 10% and q_2 is decreased by 10%. If they are kept at their original positions, the change in the force of repulsion is

(a) decreased by 10 N (b) increased by 10 N
(c) increased by 1 N (d) decreased by 1 N

STEP 1 $F \propto q_1 q_2$ at fixed r
STEP 2 $F' = 100 \times 1.1 \times 0.9 = 99$ N
STEP 3 Force is **decreased by 1 N**

Answer: **(d)**

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Solved Examples 01 Electric Charge & Coulomb's Law (contd.)

SOLVED 7 MHT CET 2026 · 13 May · Shift 1

Two point charges +2 C and +6 C repel each other with a force of 12 N. If a charge of −4 C is given to each of these charges, the force now is

(a) 4 N, repulsive (b) 4 N, attractive
(c) 12 N, attractive (d) 8 N, repulsive

STEP 1 New charges: 2 − 4 = −2 C and 6 − 4 = +2 C

STEP 2 $|F'| = 12 \times \frac{2 \times 2}{2 \times 6} = 4$ N

STEP 3 Unlike charges ⇒ **4 N, attractive**

Answer: **(b)**

SOLVED 8 MHT CET 2024 · 10 May · Shift 2

Two point charges +4q and −4q are placed at A and B along a line, separated by a distance l. The force acting between them is F. If 25% of the charge at A is transferred to B, the force between the charges now becomes

(a) $\frac{3}{4}$ F (b) $\frac{4}{3}$ F
(c) $\frac{9}{16}$ F (d) $\frac{16}{9}$ F

STEP 1 25% of +4q = q moves from A to B

STEP 2 New charges: +3q and −4q + q = −3q

STEP 3 $F' = F \times \frac{3 \times 3}{4 \times 4} = \frac{9}{16}$ **F**

Answer: **(c)**

SOLVED 9 MHT CET 2026 · 15 May · Shift 1

Two charged identical metal spheres A and B repel each other with a force 3×10^{-5} N. Another identical uncharged sphere C is touched with A and then placed at the mid-point between A and B. The net force on C is $x \times 10^{-5}$ N. The value of x is

(a) 1 (b) 2
(c) 1.5 (d) 3

STEP 1 Let A = B = q, $F = \frac{kq^2}{d^2}$. After touching, A and C each carry $\frac{q}{2}$

STEP 2 C is $\frac{d}{2}$ from each: force from A = F, from B = 2F, in opposite directions

STEP 3 Net = 2F − F = 3×10^{-5} N ⇒ x = **3**

Answer: **(d)**

SOLVED 10 MHT CET 2023 · 11 May · Shift 1

Two positively charged identical spheres separated by a distance d exert some force F on each other when they are kept in air. If both the spheres are immersed in a liquid of dielectric constant 5, the force experienced by each is (all other parameters are unchanged)

(a) 5F (b) $\frac{F}{3}$
(c) $\frac{F}{4}$ (d) $\frac{F}{5}$

STEP 1 In a medium $F' = \frac{F}{K}$

STEP 2 Here K = 5

STEP 3 $F' = \frac{F}{5}$

Answer: **(d)**

SOLVED 11 MHT CET 2026 · 15 May · Shift 2

Two point charges placed at a certain distance r in air exert a force F on each other. Then the distance r_1 at which these charges will exert the same force in a medium of dielectric constant K is

(a) r (b) $\frac{r}{K}$
(c) $\frac{r}{\sqrt{K}}$ (d) $r\sqrt{K}$

STEP 1 Air: $F = \frac{kq_1q_2}{r^2}$; medium: $F = \frac{kq_1q_2}{Kr_1^2}$

STEP 2 Equal forces ⇒ $Kr_1^2 = r^2$

STEP 3 $r_1 = \frac{r}{\sqrt{K}}$

Answer: **(c)**

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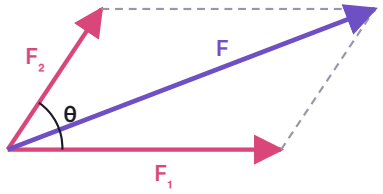
02 CONCEPT Superposition & Equilibrium of Charges

IN ONE LINE

The force on a charge is the vector sum of the forces from every other charge; a charge is in equilibrium when that sum is zero.

8.2.1 Principle of superposition

$$\vec{F} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \dots \text{ (vector sum)}$$



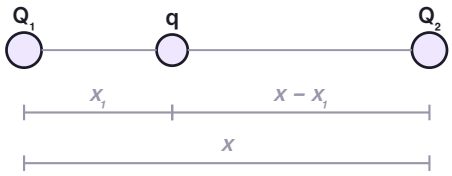
Two forces at angle θ

$$F = \sqrt{F_1^2 + F_2^2 + 2F_1F_2\cos\theta}$$

Two equal forces F at	Resultant
0°	2F
60°	$\sqrt{3}$ F
90°	$\sqrt{2}$ F
120°	F
180°	0

- Charges on a square or triangle: find each force, use symmetry, cancel the equal and opposite parts, then add.
- Three charges q at the corners of an equilateral triangle: net force on each = $\sqrt{3}$ F, F = force between two of them.
- Square with q at each corner: force on one corner = F($\sqrt{2}$ + ½), F = force from the next corner.

8.2.2 Three charges on a line



Third charge q between Q_1 and Q_2

- For q to be in equilibrium, the two forces on it must be equal and opposite.
- Like charges Q_1, Q_2: the point lies **between** them, nearer the smaller charge.
- Unlike charges: the point lies **outside**, beyond the smaller charge.
- The value or sign of q itself does not matter for its own equilibrium.

$$\frac{Q_1}{x_1^2} = \frac{Q_2}{(x - x_1)^2} \Rightarrow x_1 = \frac{x}{\sqrt{\frac{Q_2}{Q_1}} + 1}$$

8.2.3 Whole system in equilibrium

- Equal charges Q at the ends and q at the midpoint: every charge balances when $q = -\frac{Q}{4}$.
- Four charges Q at the corners of a square with q at the centre: $q = -\frac{Q}{4}(1 + 2\sqrt{2})$.
- Charges +e and +4e a distance d apart: a third charge is in equilibrium at $x = \frac{d}{3}$ from +e.

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ELECTROSTATICS

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

271	26	7
questions	concepts	topics

CONTENTS

01	Electric Charge & Coulomb's Law	Q 1–37	37 Qs
02	Electric Field & Field Lines	Q 38–46	9 Qs
03	Electric Flux & Gauss's Law	Q 47–127	81 Qs
04	Motion of Charges in an Electric Field	Q 128–142	15 Qs
05	Electric Potential & Equipotentials	Q 143–199	57 Qs
06	Electrostatic Potential Energy	Q 200–220	21 Qs
07	Electric Dipole	Q 221–271	51 Qs
	Answer key		

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TOPIC 01

Electric Charge & Coulomb's Law

37 PYQs · Easy 37 · Medium 0 · Difficult 0 | MHT CET 20 · NEET 6 · JEE 11

Concepts covered: Properties of charge & charging (7) · Coulomb's law & medium (18) · Superposition of forces (4) · Equilibrium of charges (8)

LEVEL 1 · EASY 37 questions

◆ Properties of charge & charging 7 Qs

1. Two spherical hollow spheres of radii 'R_1' and 'R_2' are charged with same charge. Let 'σ_1' and 'σ_2' are their respective charge densities, then the ratio σ_1 to σ_2 is

MHT CET 2026 · 16 APR · SHIFT 2

(a) $R_1 : R_2$ (b) $R_2 : R_1$ (c) $R_2^2 : R_1^2$ (d) $R_1^2 : R_2^2$

2. 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 from each ion will be (ε = charge on ε_k = permittivity of free space)

MHT CET 2021 · 23 SEP · SHIFT 2

(a) $\sqrt{\frac{4\pi\varepsilon_0 \mathrm{d}^2}{\mathrm{e}^2}}$ (b) $\sqrt{\frac{4\pi\varepsilon_0 \mathrm{Fd}}{\mathrm{e}^2}}$

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

3. When a piece of polythene is rubbed with wool, a negative charge of 4×10^{-7}C is developed on the polythene. The number of electrons transferred from wool to polythene is $[e = 1.6 \times 10^{-19}\mathrm{C}]$

MHT CET 2021 · 21 SEP · SHIFT 2

(a) 1.5×10^{12} (b) 3.5×10^{13}

(c) 2.5×10^{13} (d) 2.5×10^{12}

4. In case of dimensions of electric field and electric dipole moment the power of mass is respectively,

MHT CET 2019 · 3 MAY · SHIFT 1

(a) 1, 1 (b) 1, 0 (c) 0, 1 (d) 0, 0

5. A metal cube of side 5 cm is charged with 6μC. The surface charge density on the cube is

NEET 2024

(a) $0.125 \times 10^{-3}\mathrm{Cm}^{-2}$ (b) $0.25 \times 10^{-3}\mathrm{Cm}^{-2}$

(c) $4 \times 10^{-3}\mathrm{Cm}^{-2}$ (d) $0.4 \times 10^{-3}\mathrm{Cm}^{-2}$

6. 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

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

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

7. 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 · 5 APR · SHIFT 1

(a) 10^{19} (b) 10^{39} (c) 10^{29} (d) 10^{36}

◆ Coulomb's law & medium 18 Qs

8. Two point charges placed at a certain distance r in air exert force F on each other. Then the distance r_1 at which these charges will exert the same force in a medium of dielectric constant K is

MHT CET 2026 · 15 MAY · SHIFT 2

(a) r (b) $\frac{r}{K}$ (c) $\frac{r}{\sqrt{K}}$ (d) $r\sqrt{K}$

9. Two point charges q_1 and q_2 are 'l' distance apart. If one of the charges is doubled and the distance between them is halved. The magnitude of the force becomes 'n' times, where 'n' is

MHT CET 2026 · 20 APR · SHIFT 1

(a) 2 (b) 4 (c) 8 (d) 16

10. Two equal point charges exert a force F on each other when they are placed distance 'd' apart in air. When they are placed distance 'D' apart in a medium of dielectric constant K, they exert the same force. The distance D is equal to

MHT CET 2026 · 18 APR · SHIFT 2

(a) $\frac{d}{\sqrt{K}}$ (b) $d\sqrt{K}$ (c) d^2K (d) $\frac{K}{d^2}$

11. If two charges q_1 and q_2 are separated with distance 'd' and placed in a medium of dielectric constant K. What will be the equivalent distance between charges in air for the same electrostatic force?

MHT CET 2026 · 13 APR · SHIFT 2

(a) $d[k]^{1/2}$ (b) $k[d]^{1/2}$

(c) $1.5d[k]^{1/2}$ (d) $2d[k]^{1/2}$

12. Two point charges q_1 and q_2 are 'l' distance apart. If one of the charges is doubled and distance between them is halved. The magnitude of force becomes n times, where n is

MHT CET 2025 · 25 APR · SHIFT 1

(a) 1 (b) 2 (c) 8 (d) 16

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13. Two equal point charges ' q ' each exert a force ' F ' on each other, when they are placed distance ' x ' apart in air. When the same charges are placed distance ' y ' apart in a medium of dielectric constant ' k ', they exert the same force. The ratio of distance ' y ' to ' x ' is equal to

MHT CET 2024 · 3 MAY · SHIFT 1

(a) $\frac{1}{\sqrt{k}}$ (b) $\sqrt{k}$ (c) $\frac{\sqrt{k}}{2}$ (d) $\frac{2}{\sqrt{k}}$

14. Select the correct statement from the following.

MHT CET 2023 · 12 MAY · SHIFT 2

(a) Gravitational force is stronger than electrostatic force

(b) Gravitational as well as electrostatic force always attractive.

(c) Gravitational as well as electrostatic force always act along the line joining the two objects.

(d) Inverse square law $\left(F \propto \frac{1}{r^2}\right)$ is not obeyed by electrostatic force.

15. Two positively charged identical spheres separated by a distance 'd' exert some force (F) on each other when they are kept in air. If both the spheres are immersed in a liquid of dielectric constant 5, the force experienced by each is (All other parameters are unchanged.)

MHT CET 2023 · 11 MAY · SHIFT 1

(a) 5 F (b) $\frac{F}{3}$ (c) $\frac{F}{4}$ (d) $\frac{F}{5}$

16. 'F' is the force between the two identical charged particles placed at a distance 'Y' from each other. If the distance between the charges is reduced to half the previous distance then force between them becomes

MHT CET 2021 · 21 SEP · SHIFT 1

(a) $\frac{F}{4}$ (b) 4 F (c) 2 F (d) $\frac{F}{2}$

17. The acceleration of an electron due to the mutual attraction between the electron and a proton when they are 1.6 Å apart is,

($m_e \simeq 9 \times 10^{-31}$ kg, $e = 1.6 \times 10^{-19}$ C)

(Take $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$ N m^2 C^{-2})

NEET 2020 · PHASE 2

(a) 10^{25} m/s^2 (b) 10^{24} m/s^2

(c) 10^{23} m/s^2 (d) 10^{22} m/s^2

18. When air is replaced by a dielectric medium of constant K, the maximum force of attraction between two charges, separated by a distance

AIPMT 1999

(a) decreases K times (b) increase K times

(c) remains unchanged (d) becomes $\frac{1}{K^2}$ times

19. Two point charges $q_1 = 3\mu C$ and $q_2 = -4\mu C$ 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 $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$ SI Units)

JEE MAIN 2026 · 8 APR · SHIFT 2

(a) $(12\hat{i} + 24\hat{j} + 24\hat{k}) \times 10^{-3}$

(b) $(4\hat{i} + 8\hat{j} + 8\hat{k}) \times 10^{-3}$

(c) $(3\hat{i} + 6\hat{j} + 6\hat{k}) \times 10^{-3}$

(d) $(-4\hat{i} - 8\hat{j} - 8\hat{k}) \times 10^{-3}$

20. 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 · 31 JAN · SHIFT 2

(a) $5F$ (b) $25F$ (c) $F/5$ (d) $F/25$

21. A 10 μC charge is divided into two parts and placed at 1 cm distance so that the repulsive force between them is maximum. The charges of the two parts are:

JEE MAIN 2023 · 13 APR · SHIFT 2

(a) 9 μC, 1 μC (b) 5 μC, 5 μC

(c) 8 μC, 2 μC (d) 7 μC, 3 μC

22. If two charges q_1 and q_2 are separated with distance 'd' and placed in a medium of dielectric constant K. What will be the equivalent distance between charges in air for the same electrostatic force?

JEE MAIN 2023 · 24 JAN · SHIFT 1

(a) $d\sqrt{k}$ (b) $1.5d\sqrt{k}$ (c) $k\sqrt{d}$ (d) $2d\sqrt{k}$

23. A charge of 4 μC is to be divided into two. The distance between the two divided charges is constant. The magnitude of the divided charges so that the force between them is maximum, will be:

JEE MAIN 2022 · 27 JUL · SHIFT 2

(a) 1 μC and 3 μC (b) 2 μC and 2 μC

(c) 0 and 4 μ C (d) 1.5 μC and 2.5 μC

24. A certain charge Q is divided into two parts q and (Q – q). How should the charges Q and q be divided so that q and (Q – q) placed at a certain distance apart experience maximum electrostatic repulsion?

JEE MAIN 2021 · 20 JUL · SHIFT 1

(a) Q = 2q (b) Q = 4q (c) Q = 3q (d) Q = $\frac{q}{2}$

25. 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 $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{Nm}^2\text{C}^{-2}$ and universal gravitational constant as $6.67 \times 10^{-11} \text{Nm}^2\,\text{kg}^{-2}$)

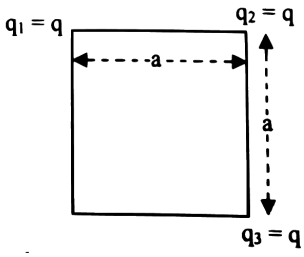
JEE MAIN 2025 · 23 JAN · SHIFT 1 *(Numerical)*

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◆ Superposition of forces 4 Qs

26. Three equal charges are placed on the three corners of a square as shown below. If the magnitude of force between ' q_1 ' and ' q_2 ' is ' F_{12} ' and that between ' q_1 ' and ' q_3 ' is F_{13}, then the ratio of F_{13} to F_{12} is

MHT CET 2025 · 23 APR · SHIFT 1



(a) $\frac{1}{\sqrt{2}}$ (b) $\sqrt{2}$ (c) $\frac{1}{2}$ (d) 2

27. Three equal charges 'q_1', "q_2 ' and 'q_3' are placed on the three corners of a square of side 'a'. If the force between q_1 and q_2 is 'F_{12}' and that between q_1 and q_3 is 'F_{13}', then the ratio of magnitudes $\left(\frac{F_{12}}{F_{13}}\right)$ is

MHT CET 2022 · 11 AUG · SHIFT 2

(a) $\frac{1}{2}$ (b) $\sqrt{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) 2

28. Three charges each of $+1\mu$C are placed at the corners of an equilateral triangle. If the repulsive force between any two charges is F, then the net force on either charge will be $[\cos 60^\circ = 0.5]$

MHT CET 2021 · 24 SEP · SHIFT 2

(a) 2F (b) 3F (c) $\sqrt{2}$ F (d) $\sqrt{3}$ F

29. Three charges + Q, q, + Q are placed respectively, at distance, 0, d/2 and d from the origin, on the x- axis. If the net force experienced by + Q, placed at x = 0, is zero, then value of q is:

JEE MAIN 2019 · 9 JAN · SHIFT 1

(a) $-\frac{Q}{4}$ (b) $+\frac{Q}{2}$ (c) $+\frac{Q}{4}$ (d) $-\frac{Q}{2}$

◆ Equilibrium of charges 8 Qs

30. 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

MHT CET 2026 · 12 MAY · SHIFT 1

(a) $\frac{-Q}{2}$ (b) $\frac{-Q}{4}$ (c) $\frac{Q}{4}$ (d) $\frac{Q}{2}$

31. Two point charges +e and +4e are kept at a distance 'd' units apart. Third point charge +q is placed between the two charges at a distance 'x' units from charge +e so as to be in equilibrium. The value of 'x' is

MHT CET 2026 · 17 APR · SHIFT 2

(a) $\frac{d}{3}$ units (b) $\frac{d}{2}$ units
(c) $\frac{2d}{5}$ units (d) $\frac{3d}{4}$ units

32. A point charge 'Q' is placed at the centre of the line joining two equal charges '+q' and '+q'. The value of 'Q' when the system is in equilibrium is

MHT CET 2026 · 15 APR · SHIFT 2

(a) $\frac{+q}{4}$ (b) $\frac{+q}{2}$ (c) $\frac{-q}{2}$ (d) $\frac{-q}{4}$

33. A point charge Q is placed at the centre of the line joining two equal point charges $+q$ and $+q$. The value of Q if the system of the charges is in equilibrium, is

MHT CET 2021 · 22 SEP · SHIFT 1

(a) $\frac{-q}{2}$ (b) $-\frac{q}{4}$ (c) $\frac{+q}{4}$ (d) $\frac{+q}{2}$

34. 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

(a) −Q/4 (b) Q/4 (c) −Q/2 (d) Q/2

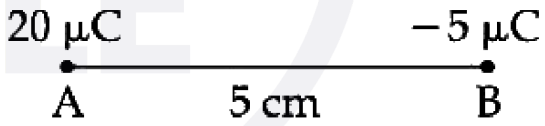
35. A charge q is placed at the centre of the line joining two exactly equal positive charges Q. The system of three charges will be in equilibrium, if q is equal to

AIPMT 1995

(a) $-Q$ (b) $Q/2$ (c) $-Q/4$ (d) $+Q$

36. Two particles A and B having charges 20μC and -5μC respectively are held fixed with a separation of 5 cm. At what position a third charged particle should be placed so that it does not experience a net electric force?

JEE MAIN 2021 · 31 AUG · SHIFT 1



(a) At 5 cm from 20 μC on the left side of system
(b) At 5 cm from − 5 μC on the right side
(c) At 1.25 cm from −5 μC between two charges
(d) At midpoint between two charges

37. If a charge q is placed at the center of the line joining two equal charges Q such that the system is in equilibrium then the value of q is

AIEEE 2002

(a) $Q/2$ (b) $-Q/2$ (c) $Q/4$ (d) $-Q/4$

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TOPIC 02

Electric Field & Field Lines

9 PYQs · Easy 9 · Medium 0 · Difficult 0 | MHT CET 3 · NEET 1 · JEE 5

Concepts covered: Field of point charges (3) · Neutral point (2) · Electric field lines (4)

LEVEL 1 · EASY 9 questions

◆ Field of point charges 3 Qs

38. In hydrogen atom an electron revolves around a proton (in nucleus) at a distance 'r' m. the intensity of electric field due to the proton at distance 'r' is $5 \times 10^{11} \mathrm{NC}^{-1}$, the magnitude of force between the electron and proton is [charge on electron $= 1.6 \times 10^{-19}$C]

MHT CET 2021 · 23 SEP · SHIFT 1

(a) 4×10^{8} N (b) 8×10^{8} N
(c) 4×10^{-8} N (d) 8×10^{-8} N

39. Electric field in a certain region is given by $\vec{E} = \left(\frac{A}{x^2}\hat{i} + \frac{B}{y^3}\hat{j}\right)$. The SI unit of A and B are:

JEE MAIN 2023 · 30 JAN · SHIFT 1

(a) $\mathrm{Nm^2C}; \mathrm{Nm^3C}$ (b) $\mathrm{Nm^3C^{-1}}; \mathrm{Nm^2C^{-1}}$
(c) $\mathrm{Nm^3C}; \mathrm{Nm^2C}$ (d) $\mathrm{Nm^2C^{-1}}; \mathrm{Nm^3C^{-1}}$

40. Two point charges A and B of magnitude $+8 \times 10^{-6}$ C and -8×10^{-6} C respectively are placed at a distance d apart. The electric field at the middle point O between the charges is 6.4×10^{4} NC^{-1}. The distance 'd' between the point charges A and B is:

JEE MAIN 2022 · 28 JUN · SHIFT 2

(a) 2.0 m (b) 3.0 m (c) 1.0 m (d) 4.0 m

◆ Neutral point 2 Qs

41. A point charge $+q$ is placed at the origin. A second point charge $+9q$ is placed at $(\mathrm{d}, 0, 0)$ in Cartesian coordinate system. The point in between them where the electric field vanishes is:

JEE MAIN 2025 · 2 APR · SHIFT 1

(a) $(3\mathrm{d}/4, 0, 0)$ (b) $(\mathrm{d}/4, 0, 0)$
(c) $(4\mathrm{d}/3, 0, 0)$ (d) $(\mathrm{d}/3, 0, 0)$

42. 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 · 31 JAN · SHIFT 1

(a) $\frac{r}{3(1+\sqrt{3})}$ (b) $\frac{(1+\sqrt{3})}{r}$
(c) $\frac{r}{(1+\sqrt{3})}$ (d) $r(1+\sqrt{3})$

◆ Electric field lines 4 Qs

43. Out of the following statements which is NOT the characteristics of electric lines of force?

MHT CET 2025 · 26 APR · SHIFT 1

(a) Electric lines of force originate from a positively charged object and end on negatively charged object.
(b) The electric lines of force do not intersect each other.
(c) The electric lines of force pass through the conductor.
(d) The electric lines of force are crowded in a region where electric intensity is large.

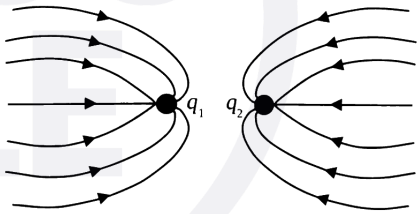
44. Which of the following statement is correct?

MHT CET 2024 · 2 MAY · SHIFT 2

(a) Electric lines of force originate from a -vely charged object and terminate on a +vely charged object.
(b) The electric line of force do not pass through an insulator but can pass through a conductor.
(c) The electric line of force do not intersect each other.
(d) Electric intensity is small in a region where the lines of force are crowded.

45. The given figure gives electric lines of force due to two charges q_1 and q_2. What are the signs of the two charges?

AIPMT 1994



(a) q_1 is positive but q_2 is negative
(b) q_1 is negative but q_2 is positive
(c) both are negative
(d) both are positive

46. Identify the correct statements:

A. Electrostatic field lines form closed loops.

B. The electric field lines point radially outward when charge is greater than zero. C. The Gauss - 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.

Choose the correct answer from the options given below:

JEE MAIN 2026 · 28 JAN · SHIFT 2

(a) A, C, E Only (b) A, B, D, E Only
(c) B, C, D, E Only (d) A, B, C, D Only

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TOPIC 03

Electric Flux & Gauss's Law

81 PYQs · Easy 81 · Medium 0 · Difficult 0 | MHT CET 30 · NEET 18 · JEE 33

Concepts covered: Electric flux (10) · Gauss's law & enclosed charge (40) · Field of line, sheet & sphere (Gauss) (14) · Conductors (17)

LEVEL 1 · EASY 81 questions

◆ Electric flux 10 Qs

47. The electric field in the region is $\vec{E} = a\hat{i} + b\hat{j}$ where 'a' and 'b' are constants. The net electric flux passing through a square area of side 'l' parallel to Y-Z plane is

MHT CET 2026 · 16 APR · SHIFT 1

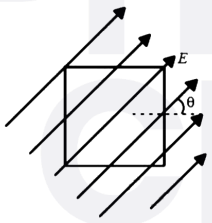
(a) al (b) al^4 (c) al^6 (d) al^2

48. The number of lines of force originating from a point charge of $2 \times 8.85 \times 10^{-9}$ C in a medium of dielectric constant 10 is ($\epsilon_0 = 8.85 \times 10^{-12}$ SI unit)

MHT CET 2026 · 15 APR · SHIFT 1

(a) 100 (b) 200 (c) 400 (d) 2000

49. 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 figurre.



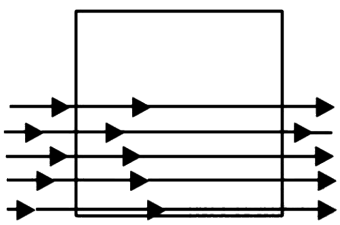
The electric flux linked to the surface, in units of volt m is

AIPMT 2010 · PRELIMS

(a) (b) $EL^2\cos\theta$
(c) $EL^2\sin\theta$ (d) zero EL^2

50. 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 inits associated with the surface is

AIPMT 2006



(a) EL^2 (b) $EL^2/2_{\varepsilon 0}$
(c) $EL^2/2$ (d) zero

51. The electric flux is $\phi = \alpha\sigma + \beta\lambda$ where λ and σ are linear and surface charge density, respectively. $\left(\frac{\alpha}{\beta}\right)$ represents

JEE MAIN 2025 · 23 JAN · SHIFT 1

(a) displacement (b) charge
(c) electric field (d) area

52. An electric field is given by $(6\hat{i} + 5\hat{j} + 3\hat{k})$N/C. The electric flux through a surface area $30\hat{i}\,\text{m}^2$ lying in YZ-plane (in SI unit) is:

JEE MAIN 2024 · 29 JAN · SHIFT 2

(a) 60 (b) 90 (c) 180 (d) 150

53. 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 _____ cm^2.

JEE MAIN 2025 · 7 APR · SHIFT 2 *(Numerical)*

54. An electric field, $\vec{E} = \frac{2\hat{i}+6\hat{j}+8\hat{k}}{\sqrt{6}}$ passes through the surface of $4\,\text{m}^2$ 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 _____ Vm.

JEE MAIN 2024 · 8 APR · SHIFT 1 *(Numerical)*

55. The electric field in a region is given by $\vec{E} = \frac{2}{5}E_0\hat{i} + \frac{3}{5}E_0\hat{j}$ with $E_0 = 4.0 \times 10^3 \frac{N}{C}$. The flux of this field through a rectangular surface area 0.4 m^2 parallel to the Y-Z plane is _____ Nm^2C^{-1}.

JEE MAIN 2021 · 17 MAR · SHIFT 2 *(Numerical)*

56. The electric field in a region is given by $\vec{E} = \left(\frac{3}{5}E_0\hat{i} + \frac{4}{5}E_0\hat{j}\right)\frac{N}{C}$. The ratio of flux of reported field through the rectangular surface of area 0.2 m^2 (parallel to y – z plane) to that of the surface of area 0.3 m^2 (parallel to x – z plane) is a: b, where a = _____ [Here $\hat{i}$ $\hat{j}$ and $\hat{k}$ are unit vectors along x, y and z-axes respectively.]

JEE MAIN 2021 · 25 FEB · SHIFT 1 *(Numerical)*

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◆ Gauss's law & enclosed charge 40 Qs

57. The electric flux entering and leaving an enclosed surface are Φ_1 and Φ_2 respectively. The electric charge inside the surface will be (ε_0 = permittivity of vacuum)

MHT CET 2026 · 14 MAY · SHIFT 1

(a) $\frac{\phi_2 - \phi_1}{\varepsilon_0}$ (b) $\frac{\phi_1 + \phi_2}{\varepsilon_0}$

(c) $\varepsilon_0(\phi_1 - \phi_2)$ (d) $\varepsilon_0(\phi_2 - \phi_1)$

58. A charge 'Q' C is placed at the centre of a cube. The electric flux through two opposite faces of the cube is (ϵ_0 = permittivity of free space)

MHT CET 2026 · 13 APR · SHIFT 1

(a) $\frac{Q}{6\epsilon_0}$ (b) $\frac{Q}{3\epsilon_0}$ (c) $\frac{Q}{}$ (d) $\frac{Q}{2\epsilon_0}\ \epsilon_0$

59. If the radius of the spherical Gaussian surface is increased then the electric flux due to a point charge enclosed by the surface

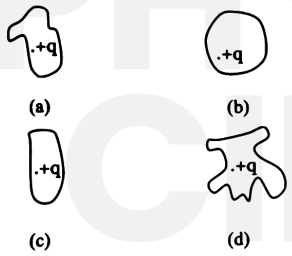
MHT CET 2026 · 11 APR · SHIFT 2

(a) increases (b) remains unchanged

(c) is zero (d) decreases

60. The electric flux through the surface

MHT CET 2025 · 5 MAY · SHIFT 2



(a) in figure (c) is the largest

(b) in figure (b) is same as figure (c) but is smaller than figure (d)

(c) is the same for all the figures

(d) in figure (d) is the least

61. A charge is uniformly distributed on the surface of a spherical rubber balloon. As it is blown up, the total electric flux coming out of the surface

MHT CET 2025 · 5 MAY · SHIFT 2

(a) decreases. (b) increases.

(c) remains unchanged. (d) becomes zero.

62. A charge QμC is placed at the centre of a cube. The flux through two opposite faces of the cube is (ε_0 = permittivity of free space)

MHT CET 2025 · 22 APR · SHIFT 2

(a) $\frac{\mathrm{Q}}{6\varepsilon_0}$ (b) $\frac{\mathrm{Q}}{3\varepsilon_0}$ (c) $\frac{\mathrm{Q}}{\varepsilon_0}$ (d) $\frac{\mathrm{Q}}{2\varepsilon_0}$

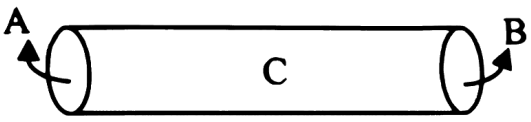
63. Four charges 2μC, -3μC, 4μC, -4μC and -1μC are enclosed by the Gaussian surface of radius 2 m. Net outward flux through the Gaussian surface is (in μV − m) [ε_0 = permittivity of free space]

MHT CET 2025 · 22 APR · SHIFT 1

(a) $\frac{2}{\varepsilon_0}$ (b) zero (c) $\frac{6}{\varepsilon_0}$ (d) $\frac{5}{\varepsilon_0}$

64. A hollow cylinder has a charge ' q ' coulomb within it. If ' ϕ ' is the electric flux in unit of V-m associated with the curved surface C, the flux linked with the plane surface ' A ' in unit of V-m will be [ε_0 = permittivity of free space]0

MHT CET 2025 · 20 APR · SHIFT 2



(a) $\frac{\phi}{3}$ (b) $\left(\frac{\mathrm{q}}{\varepsilon_0} - \phi\right)$

(c) $\frac{1}{2}\left(\frac{\mathrm{q}}{\varepsilon_0} - \phi\right)$ (d) $\frac{\mathrm{q}}{2\varepsilon_0}$

65. A hollow cylinder has a charge of ' q ' C within it. If ϕ is the electric flux associated with the curved surface B, the flux linked with the plane surface A will be

MHT CET 2025 · 20 APR · SHIFT 1

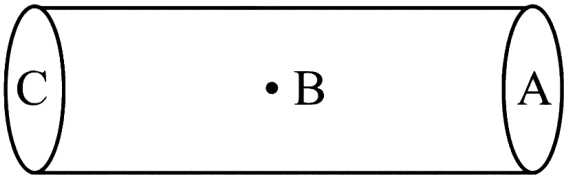


(a) $\frac{\phi}{3}$ (b) $\frac{\mathrm{q}}{\varepsilon_0} - \phi$

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

66. A hollow cylinder has charge ' q ' C within it. If ' ϕ ' is the electric flux associated with the curved surface B, the flux linked with the plane surface A will be:

MHT CET 2024 · 16 MAY · SHIFT 2



(a) $\frac{1}{2}\left(\frac{\mathrm{q}}{\varepsilon_0} - \phi\right)$ (b) $\frac{q}{2\varepsilon_0}$

(c) $\frac{\phi}{3}$ (d) $\frac{q}{\varepsilon_0} - \phi$

67. The electric flux over a sphere of radius ' r ' is ' ϕ '. If the radius of the sphere is doubled without changing the charge, the flux will be

MHT CET 2024 · 9 MAY · SHIFT 2

(a) 4ϕ (b) 2ϕ (c) ϕ (d) $\frac{\phi}{2}$

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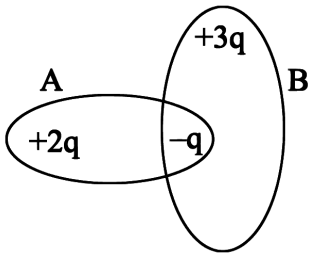
68. If the electric flux entering and leaving an enclosed surface is ϕ_1 and ϕ_2 then charge enclosed in the surface is (ε_0 = permittivity of free space)

MHT CET 2024 · 9 MAY · SHIFT 1

(a) $\frac{\phi_2-\phi_1}{\varepsilon_0}$ (b) $\frac{\phi_2+\phi_1}{\varepsilon_0}$
(c) $\frac{\phi_1-\phi_2}{\varepsilon_0}$ (d) $\varepsilon_0(\phi_2-\phi_1)$

69. Two surfaces A and B are enclosing the charges as shown below. The total normal electric induction (T.N.E.I) through the surfaces A and B are respectively.

MHT CET 2024 · 4 MAY · SHIFT 2



(a) $+2q$ and $+2q$ (b) $+q$ and $+3q$
(c) $+q$ and $+2q$ (d) $+2q$ and $+3q$

70. A spherical rubber balloon carries a charge, uniformly distributed over the surface. As the balloon is blown up and increases in size, the total electric flux coming out of the surface

MHT CET 2024 · 4 MAY · SHIFT 2

(a) becomes zero (b) decreases
(c) increases (d) remains unchanged

71. If the electric flux entering and leaving an enclosed surface are ϕ_1 and ϕ_2 respectively, the electric charge inside the surface will be

MHT CET 2024 · 4 MAY · SHIFT 2

(a) $\frac{\phi_2-\phi_1}{\varepsilon_0}$ (b) $\frac{\phi_1+\phi_2}{\varepsilon_0}$
(c) $\varepsilon_0(\phi_1-\phi_2)$ (d) $\varepsilon_0(\phi_2-\phi_1)$

72. If the radius of the spherical gaussian surface is increased then the electric flux due to a point charge enclosed by the surface

MHT CET 2022 · 11 AUG · SHIFT 2

(a) increases (b) remains unchanged
(c) decreases (d) zero

73. A spherical rubber balloon carries a charge, uniformly distributed over the surface. As the balloon is blown up and increases in size, the total electric flux coming out of the surface

MHT CET 2020 · 16 OCT · SHIFT 2

(a) increases (b) remains unchanged
(c) becomes zero (d) decreases

74. According to Gauss law of electrostatics, electric flux through a closed surface depends on:

NEET 2023

(a) the area of the surface
(b) the quantity of charges enclosed by the surface
(c) the shape of the surface
(d) the volume enclosed by the surface

75. A charge Q μC is placed at the centre of a cube. The flux coming out from any one of its faces will be (in SI unit):

NEET 2023

(a) $\frac{Q}{\epsilon_0}\times10^{-6}$ (b) $\frac{2Q}{3\epsilon_0}\times10^{-3}$
(c) $\frac{Q}{6\epsilon_0}\times10^{-3}$ (d) $\frac{Q}{6\epsilon_0}\times10^{-6}$

76. If $\oint_s \vec{E}\cdot\overrightarrow{dS}=0$ over a surface, then:

NEET 2023

(a) the magnitude of electric field on the surface is constant.
(b) all the charges must necessarily be inside the surface.
(c) the electric field inside the surface is necessarily uniform.
(d) the number of flux lines entering the surface must be equal to the number of flux lines leaving it.

77. A sphere encloses an electric dipole with charges $\pm3\times10^{-6}$ C. What is the total electric flux across the sphere?

NEET 2019

(a) $6\times10^{-6}\,\mathrm{N\,m^2/C}$ (b) $-3\times10^{-6}\,\mathrm{N\,m^2/C}$
(c) Zero (d) $3\times10^{-6}\,\mathrm{N\,m^2/C}$

78. 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

(a) $\frac{2q}{\varepsilon_0}$ (b) $\frac{q}{8\varepsilon_0}$ (c) $\frac{q}{\varepsilon_0}$ (d) $\frac{q}{2\varepsilon_0}6a^2$

79. A charge Q is enclosed by a Gaussian spherical surface of radius R. If the radius is doubled, then the outward electric flux will

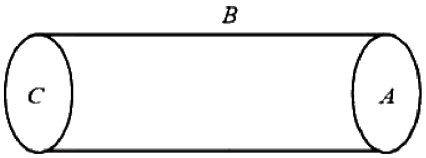
AIPMT 2011 · PRELIMS

(a) increase four times (b) be reduced to half
(c) remain the same (d) be doubled

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80. 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



(a) $\frac{q}{2\varepsilon_0}$ (b) $\frac{\phi}{3}$

(c) $\frac{q}{\varepsilon_0} - \phi$ (d) $\frac{1}{2}\left(\frac{q}{\varepsilon_0} - \phi\right)$

81. A charge q is located at the centre of a cube. The electric flux through any face is

AIPMT 2003

(a) $\frac{2\pi q}{6(4\pi\varepsilon_0)}$ (b) $\frac{4\pi q}{6(4\pi\varepsilon_0)}$ (c) $\frac{\pi q}{6(4\pi\varepsilon_0)}$ (d) $\frac{q}{6(4\pi\varepsilon_0)}$

82. A charge QμC is placed at the centre of a cube, the flux coming out from each face will be

AIPMT 2001

(a) $\frac{Q}{6\varepsilon_0} \times 10^{-6}$ (b) $\frac{Q}{6\varepsilon_0} \times 10^{-3}$

(c) $\frac{Q}{24\varepsilon_0}$ (d) $\frac{Q}{8\varepsilon_0}$

83. 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

(a) $\frac{Q}{6\varepsilon_0}$ (b) $\frac{Q}{8\varepsilon_0}$ (c) $\frac{Q}{\varepsilon_0}$ (d) $\frac{Q}{2\varepsilon_0}$

84. A point charge $+q$ is placed at the centre of a cube of side l. The electric flux emerging from the cube is

AIPMT 1996

(a) $\frac{6ql^2}{\varepsilon_0}$ (b) $\frac{q}{6l^2\varepsilon_0}$ (c) zero (d) $\frac{q}{\varepsilon_0}$

85. Two point charges $8\,\mu C$ and $-2\,\mu C$ are located at $x = 2$ cm and $x = 4$ 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 · 2 APR · SHIFT 2

(a) 4: 1 (b) 3: 4 (c) 4: 3 (d) 4: 5

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

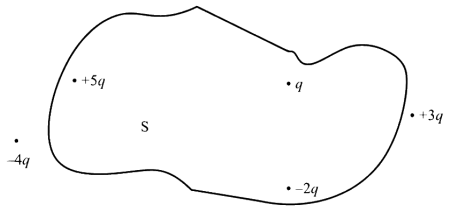
JEE MAIN 2025 · 29 JAN · SHIFT 2

(a) 17.7×10^{-8}C (b) -17.7×10^{-8}C

(c) 15.7×10^{-8}C (d) -15.7×10^{-8}C

87. 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 · 9 APR · SHIFT 2



(a) $\frac{q}{\epsilon_0}$ (b) $\frac{3q}{\epsilon_0}$ (c) $\frac{5q}{\epsilon_0}$ (d) $\frac{4q}{\epsilon_0}$

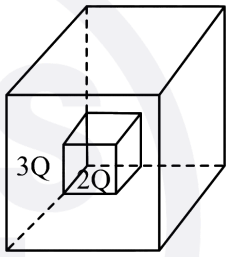
88. A charge q is placed at the center of one of the surfaces of a cube. The flux linked with the cube is:

JEE MAIN 2024 · 4 APR · SHIFT 2

(a) $\frac{q}{2\epsilon_0}$ (b) Zero (c) $\frac{q}{4\epsilon_0}$ (d) $\frac{q}{8\epsilon_0}$

89. 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 · 1 FEB · SHIFT 2



(a) 3 : 2 (b) 5 : 2 (c) 2 : 5 (d) 2 : 3

90. 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 · 29 JAN · SHIFT 1

(a) $\frac{2Q}{\varepsilon_0}$ (b) $\frac{7Q}{\varepsilon_0}$ (c) $\frac{3Q}{\varepsilon_0}$ (d) $\frac{5Q}{\varepsilon_0}$

91. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R

Assertion A: If an electric dipole of dipole moment 30×10^{-5} C m is enclosed by a closed surface, the net flux coming out of the surface will be zero.

Reason R: Electric dipole consists of two equal and opposite charges.

In the light of the above statements, choose the correct answer from the options given below.

JEE MAIN 2023 · 12 APR · SHIFT 1

(a) A is true but R is false

(b) A is false but R is true

(c) Both A and R are true but R is NOT the correct explanation of A

(d) Both A and R are true and R is the correct explanation of A

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92. Given below are two statements:

Statement I: An electric dipole is placed at the center of a hollow sphere. The flux of the electric field through the sphere is zero but the electric field is not zero anywhere in the sphere. Statement II: If R is the radius of a solid metallic sphere and Q be the total charge on it. The electric field at any point on the spherical surface of radius r (< R) is zero but the electric flux passing through this closed spherical surface of radius r is not zero.

In the light of the above statements, choose the correct answer from the options given below:

JEE MAIN 2021 · 26 FEB · SHIFT 2

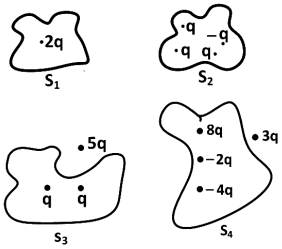
(a) Both Statement I and Statement II are true
(b) Statement I is false but Statement II is true
(c) Statement I is true but Statement II is false
(d) Both Statement I and Statement II are false

93. In finding the electric field using Gauss Law the formula $\left|\vec{E}\right| = \frac{q_{enc}}{\varepsilon_0 |A|}$ is applicable. In the formula ε_0 is permittivity of free space, A is the area of Gaussian surface and q_{enc} is charge enclosed by the Gaussian surface. The equation can be used in which of the following situation?

JEE MAIN 2020 · 8 JAN · SHIFT 1

(a) Only when $\left|\vec{E}\right|$ = constant on the surface.
(b) For any choice of Gaussian surface.
(c) Only when the Gaussian surface is an equipotential surface.
(d) Only when the Gaussian surface is an equipotential surface and $\left|\vec{E}\right|$ is constant on the surface.

94. Four closed surfaces and corresponding charge distributions are shown below.



Let the respective electric fluxes through the surfaces be Φ_1, Φ_2, Φ_3 and Φ_4. Then:

JEE MAIN 2017 · 9 APR · SHIFT 1

(a) $\Phi_1 < \Phi_2 = \Phi_3 > \Phi_4$ (b) $\Phi_1 > \Phi_2 > \Phi_3 > \Phi_4$
(c) $\Phi_1 = \Phi_2 = \Phi_3 = \Phi_4$ (d) $\Phi_1 > \Phi_3$; $\Phi_2 < \Phi_4$

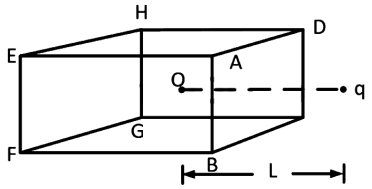
95. If the electric flux entering and leaving an enclosed surface respectively is ϕ_1 and ϕ_2, the electric charge inside the surface will be

AIEEE 2003

(a) $(\phi_2 - \phi_1)\varepsilon_0$ (b) $(\phi_2 + \phi_1)/\varepsilon_0$
(c) $(\phi_1 - \phi_2)/\varepsilon_0$ (d) $(\phi_1 + \phi_2)\varepsilon_0$

96. A charged particle q is placed at the centre O of cube of length $L(ABCDEFGH)$. Another same charge q is placed at a distance L from O. Then the electric flux through $ABCD$ is

AIEEE 2002



(a) $q/4\pi\in_0 L$ (b) zero
(c) $q/2\pi\in_0 L$ (d) $q/3\pi\in_0 L$

◆ Field of line, sheet & sphere (Gauss) 14 Qs

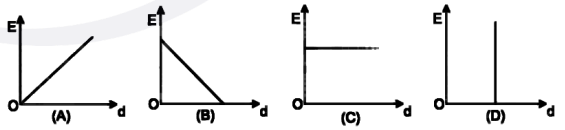
97. An infinite line charge produces a field of 9×10^8 N/C at a distance of 2 cm. The linear charge density is $\left(\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ SI unit}\right)$

MHT CET 2026 · 14 MAY · SHIFT 2

(a) 10^{-3} C/m (b) 2×10^{-3} C/m
(c) 4×10^{-3} C/m (d) 10^{-2} C/m

98. For a uniformly charged plane sheet, the variation of electric field (E) with distance (d) is correctly shown graphically in graph

MHT CET 2026 · 15 APR · SHIFT 2



(a) A (b) B (c) C (d) D

99. The electric field intensity on the surface of a solid charged sphere of radius **r** and volume charge density σ is (ε_0 = permittivity of free space)

MHT CET 2025 · 21 APR · SHIFT 2

(a) zero (b) $\frac{5\sigma r}{6\varepsilon_0}$ (c) $\frac{1}{4\pi\varepsilon_0}\frac{\sigma}{r}$ (d) $\frac{\sigma r}{3\varepsilon_0}$

100. A charge 17.7×10^{-4}C is distributed uniformly over a large sheet of area 200 m^2. The electric field intensity at a distance 20 cm from it in air will be $\left[\varepsilon_0 = 8.85 \times 10^{-12} C^2/Nm^2\right]$

MHT CET 2023 · 14 MAY · SHIFT 2

(a) 5×10^5 N/C (b) 6×10^5 N/C
(c) 7×10^5 N/C (d) 8×10^5 N/C

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101. The electric field intensity on the surface of a solid charged sphere of radius 'r' and volume charge density 'ρ' is (ε_0 = permittivity of free space)

MHT CET 2023 · 14 MAY · SHIFT 1

(a) $\frac{\rho r}{3\varepsilon_0}$ (b) $\frac{\rho}{4\pi\varepsilon_0 r}$ (c) zero (d) $\frac{5\rho r}{6\varepsilon_0}$

102. The electric field intensity on the surface of a charged solid sphere of radius 'r' and volume charge density 'ρ' is given by (ϵ_0 = permittivity of free space)

MHT CET 2021 · 24 SEP · SHIFT 1

(a) zero (b) $\frac{\rho r}{3\epsilon_0}$ (c) $\frac{1}{4\pi\epsilon_0}\frac{\sigma}{r}$ (d) $\frac{5\pi}{6\epsilon_0}$

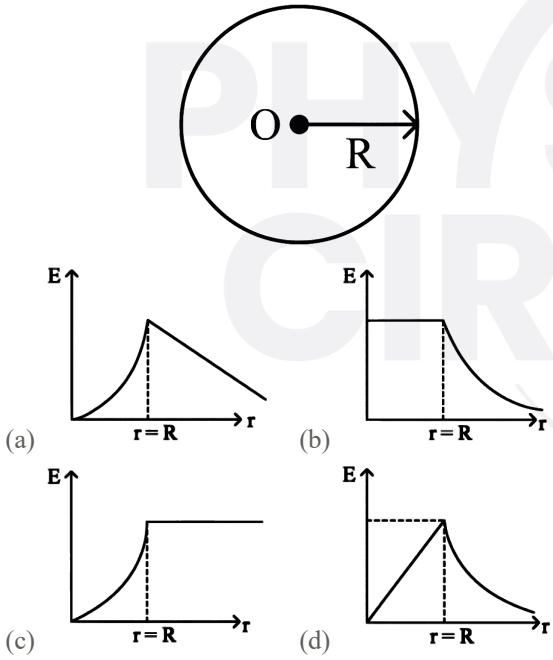
103. σ is the uniform surface charge density of a thin spherical shell of radius R. The electric field at any point on the surface of the spherical shell is:

JEE MAIN 2024 · 6 APR · SHIFT 1

(a) $\sigma/\epsilon_o R$ (b) σ/ϵ_o (c) $\sigma/2\epsilon_o$ (d) $\sigma/4\epsilon_o$

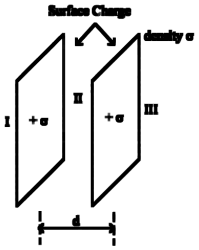
104. Graphical variation of electric field due to a uniformly charged insulating solid sphere of radius R, with distance r from the centre O is represented by:

JEE MAIN 2023 · 8 APR · SHIFT 1



105. Let σ be the uniform surface charge density of two infinite thin plane sheets shown in figure. Then the electric fields in three different regions E_I, E_{II} and E_{III} are:

JEE MAIN 2023 · 1 FEB · SHIFT 1



(a) $\vec{E}_I = 0, \vec{E}_{II} = \frac{\sigma}{\epsilon_0}\hat{n}, E_{III} = 0$

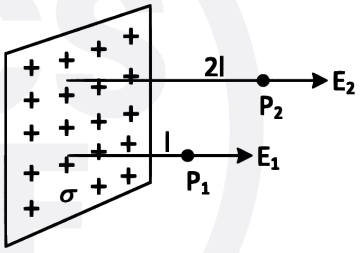
(b) $\vec{E}_I = \frac{\sigma}{2\epsilon_0}\hat{n}, \vec{E}_{II} = 0, \vec{E}_{III} = \frac{\sigma}{2\epsilon_0}\hat{n}$

(c) $\vec{E}_I = -\frac{\sigma}{\epsilon_0}\hat{n}, \vec{E}_{II} = 0, \vec{E}_{III} = \frac{\sigma}{\epsilon_0}\hat{n}$

(d) $\vec{E}_I = \frac{2\sigma}{\epsilon_0}\hat{n}, \vec{E}_{II} = 0, \vec{E}_{III} = \frac{2\sigma}{\epsilon_0}\hat{n}$

106. In the figure, a very large plane sheet of positive charge is shown. P_1 and P_2 are two points at distance l and 2l from the charge distribution. If σ is the surface charge density, then the magnitude of electric fields E_1 and E_2 at P_1 and P_2 respectively are:

JEE MAIN 2022 · 25 JUN · SHIFT 1



(a) $E_1 = \sigma/\varepsilon_0,\ E_2 = \sigma/2\varepsilon_0$

(b) $E_1 = 2\sigma/\varepsilon_0,\ E_2 = \sigma/\varepsilon_0$

(c) $E_1 = E_2 = \sigma/2\varepsilon_0$

(d) $E_1 = E_2 = \sigma/\varepsilon_0$

107. Consider the force F on a charge 'q' due to a uniformly charged spherical shell of radius R carrying charge Q distributed uniformly over it. Which one of the following statements is true for F, if 'q' is placed at distance r from the centre of the shell?

JEE MAIN 2020 · 6 SEP · SHIFT 2

(a) $\frac{1}{4\pi\varepsilon_0}\frac{qQ}{R^2} > F > 0$ for r < R

(b) $F = \frac{1}{4\pi\varepsilon_0}\frac{qQ}{r^2}$ for r > R

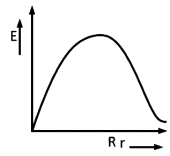
(c) $F = \frac{1}{4\pi\varepsilon_0}\frac{qQ}{r^2}$ for all r

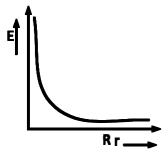
(d) $F = \frac{1}{4\pi\varepsilon_0}\frac{qQ}{R^2}$ for r < R

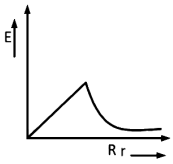
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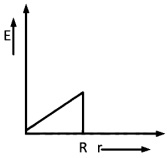
108. In a uniformly charged sphere of total charge Q and radius R, the electric field E is plotted as a function of distance from the center. The graph which would correspond to the above will be:

AIEEE 2012

(a) 

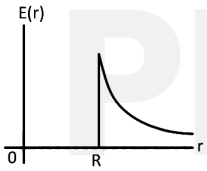
(b) 

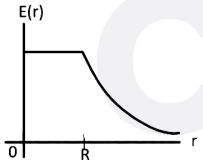
(c) 

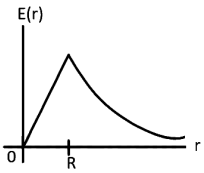
(d) 

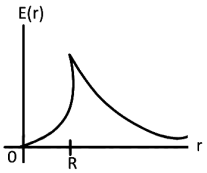
109. A thin spherical shell of radius R has charge Q spread uniformly over its surface. Which of the following graphs most closely represents the electric field $E(r)$ produced by the shell in the range $0 \leq r < \infty$, where r is the distance from the center of the shell?

AIEEE 2008

(a) 

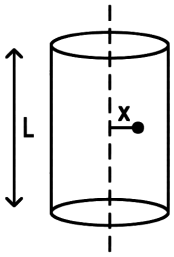
(b) c 

(c) 

(d) 

110. A long cylindrical volume contains a uniformly distributed charge of density $\rho\,\mathrm{Cm}^{-3}$. The electric field inside the cylindrical volume at a distance $x = \frac{2\varepsilon_0}{\rho}\mathrm{m}$ from its axis is _____ Vm^{-1}.

JEE MAIN 2022 · 27 JUL · SHIFT 1 *(Numerical)*



◆ Conductors 17 Qs

111. The electric field intensity at a point near and outside the surface of a charged conductor of any shape is E_1. The electric field intensity due to a uniformly charged infinite thin plane sheet having the same surface charge density is E_2. The relation between E_1 and E_2 is

MHT CET 2026 · 14 MAY · SHIFT 2

(a) $2E_1 = E_2$ (b) $E_1 = E_2$
(c) $E_1 = 2E_2$ (d) $E_1 = 4E_2$

112. The electric field intensity near a conducting surface having uniform surface charge density ' σ ' is given by (ε_0 = permittivity of free space)

MHT CET 2025 · 23 APR · SHIFT 1

(a) $\frac{\sigma}{\varepsilon_0}$ and is parallel to the surface
(b) $\frac{2\sigma}{\varepsilon_0}$ and is parallel to the surface
(c) $\frac{\sigma}{\varepsilon_0}$ and is normal to the surface
(d) $\frac{2\sigma}{\varepsilon_0}$ and is normal to the surface

113. The van de Graaff Generator is not based on

MHT CET 2024 · 9 MAY · SHIFT 2

(a) the phenomenon of Corona Discharge in X-ray tube.
(b) the application of electric field and magnetic field which are perpendicular to each other.
(c) the property that charge given to a hollow conductor is transferred to its outer surface and distributed uniformly over it.
(d) the fact that a charge is continuously supplied to an isolated metallic conductor, the potential of the conductor goes on increasing.

114. Which of the following statements is 'WRONG' for the conductors?

MHT CET 2023 · 13 MAY · SHIFT 1

(a) In static situation, the interior of conductor can have no charge.
(b) The net electrostatic field is zero in the interior of a conductor.
(c) The electrostatic field just outside the surface of charged conductor must be tangential to the surface at any point.
(d) The electrostatic potential is constant within and

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on the surface of a conductor.

115. Van de Graaff generator produces

MHT CET 2020 · 19 OCT · SHIFT 2

(a) high voltage and high current
(b) high voltage and low current
(c) low voltage and low current
(d) low voltage and high current

116. Which of the following statements are correct?

A. Inside a conductor, the electrostatic field is zero.
B. Electric field at the surface of a charged conductor does not depend on its surface charge density.
C. The interior of a charged conductor can have no excess charge in the static situation. D. At the surface of a charged conductor, the electrostatic field must be normal to the surface at every point.
E. The electrostatic potential is zero everywhere inside a charged conductor.
Choose the correct answer from the options given below:

NEET 2026

(a) A, B and D only (b) A, C and E only
(c) A, C and D only (d) C, D and E only

117. 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?
$\left(\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2/c^2\right)$

NEET 2020 · PHASE 1

(a) 1.28×10^5 N/C (b) 1.28×10^6 N/C
(c) 1.28×10^7 N/C (d) 1.28×10^4 N/C

118. 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 2019

(a) zero as r increases for r < R, decreases as r increases for r > R
(b) zero as r increases for r < R, increases as r increases for r > R.
(c) decreases as r increases for r < R and for r > R.
(d) increases as r increases for r < R and for r > R.

119. 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

(a) zero (b) E (c) $\frac{E}{2}$ (d) $\frac{E}{3}$

120. A hollow insulated conducting sphere is given a positive charge of 10 μC. What will be the electric field at the centre of the sphere if its radius is 2 m?

AIPMT 1998

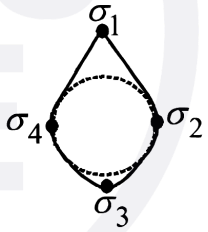
(a) Zero (b) 5 μC m^{-2}
(c) 20 μC m^{-2} (d) 8 μC m^{-2}

121. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason **R**
Assertion A: In electrostatics, a conductor does not store any net charge inside. Reason R: Inside the capacitor (with no dielectric medium), the free charge carriers, if placed between the plates of capacitor, experience force and drift.
Choose the correct answer from the options given below

JEE MAIN 2026 · 4 APR · SHIFT 2

(a) Both **A** and **R** are true and **R** is the correct explanation of **A**
(b) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
(c) A is true but **R** is false
(d) A is false but **R** is true

122. Electric charge is transferred to an irregular metallic disk as shown in the figure. If σ_1, σ_2, σ_3 and σ_4 are charge densities at given points then, choose the correct answer from the options given below:



A. $\sigma_1 > \sigma_3; \sigma_2 = \sigma_4$
B. $\sigma_1 > \sigma_2; \sigma_3 > \sigma_4$
C. $\sigma_1 > \sigma_3 > \sigma_2 = \sigma_4$
D. $\sigma_1 < \sigma_3 < \sigma_2 = \sigma_4$
E. $\sigma_1 = \sigma_2 = \sigma_3 = \sigma_4$

JEE MAIN 2025 · 8 APR · SHIFT 2

(a) B and C Only (b) A and C Only
(c) D and E Only (d) A, B and C Only

123. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The outer body of an aircraft is made of metal which protects persons sitting inside from lightning strikes.
Reason (R): The electric field inside the cavity enclosed by a conductor is zero. In the light of the above statements, choose the most appropriate answer from the options given below:

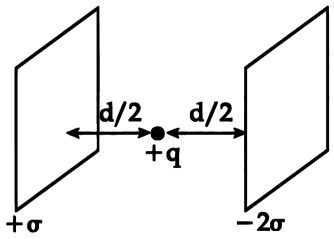
JEE MAIN 2025 · 7 APR · SHIFT 2

(a) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) Both (A) and (R) are correct and (R) is the correct

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explanation of (A)
(d) (A) is not correct but (R) is correct

124. 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 · 2 APR · SHIFT 1

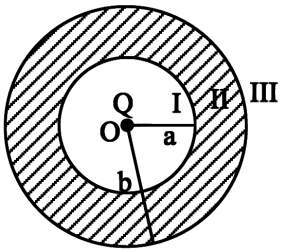


(a) $\frac{3\sigma q}{4\epsilon_0}$ (b) $\frac{3\sigma q}{2\epsilon_0}$ (c) $\frac{\sigma q}{4\epsilon_0}$ (d) $\frac{\sigma q}{2\epsilon_0}$

125. The vehicles carrying inflammable fluids usually have metallic chains touching the ground:
JEE MAIN 2024 · 5 APR · SHIFT 2

(a) To protect tyres from catching dirt from ground
(b) It is a custom
(c) To alert other vehicles
(d) To conduct excess charge due to air friction to ground and prevent sparking

126. As shown in the figure, a point charge Q is placed at the centre of conducting spherical shell of inner radius a and outer radius b. The electric field due to charge Q in three different regions I, II and III is given by:
(I : $r < a$, II : $a < r < b$, III: $r > b$)
JEE MAIN 2023 · 30 JAN · SHIFT 2



(a) $E_I = 0, E_{II} = 0, E_{III} \neq 0$
(b) $E_I \neq 0, E_{II} = 0, E_{III} = 0$
(c) $E_I \neq 0, E_{II} = 0, E_{III} \neq 0$
(d) $E_I = 0, E_{II} = 0, E_{III} = 0$

127. Given below are two statements.
Statement I: Electric potential is constant within and at the surface of each conductor. Statement II: Electric field just outside a charged conductor is perpendicular to the surface of the conductor at every point.
In the light of the above statements, choose the most appropriate answer from the options given below.
JEE MAIN 2022 · 29 JUL · SHIFT 1

(a) Both Statement I and Statement II are correct
(b) Both Statement I and Statement II are incorrect
(c) Statement I is correct but Statement II is incorrect
(d) Statement I is incorrect but Statement II is correct

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TOPIC 04

Motion of Charges in an Electric Field

15 PYQs · Easy 15 · Medium 0 · Difficult 0 | MHT CET 8 · NEET 1 · JEE 6

Concepts covered: Force, acceleration & energy in a field (12) · Deflection across a field (2) · Charged pendulum & oscillations (1)

LEVEL 1 · EASY 15 questions

◆ Force, acceleration & energy in a field 12 Qs

128. An electric charge of magnitude '$2e$' and mass '$2m$' is moving in an electric field 'E'. The acceleration imparted to the charge is

MHT CET 2026 · 20 MAY · SHIFT 1

(a) $\frac{2eE}{m}$ (b) $\frac{eE}{m}$ (c) $\frac{eE}{2m}$ (d) $\frac{me}{2E}$

129. A charged particle of mass ' m ' and charge ' q ' is at rest. It is acce:lerated in a uniform electric field of intensity ' E ': for time ' t '. The kinetic energy of the particles after time t is

MHT CET 2025 · 19 APR · SHIFT 2

(a) $\frac{Eqm}{2t}$ (b) $\frac{E^2q^2t^2}{2m}$ (c) $\frac{2E^2t^2}{mq^2}$ (d) $\frac{Eqt}{m}$

130. A particle ' A ' has charge ' $+q$ ' and a particle ' B ' has charge ' $+4q$ '. Each has same mass ' m '. When they are allowed to fall from rest through the same potential, the ratio of their speeds will become (particle A to particle B)

MHT CET 2024 · 11 MAY · SHIFT 2

(a) 2 : 1 (b) 1 : 2 (c) 1 : 4 (d) 4 : 1

131. An electron of mass ' m ' and charge ' q ' is accelerated from rest in a uniform electric field of intensity ' E '. The velocity acquired by it as it travels a distance ' l ' is ' v '. The ratio $\frac{q}{m}$ in terms of E, l and v is

MHT CET 2024 · 4 MAY · SHIFT 2

(a) $\frac{v^2}{2El}$ (b) $\frac{v^2l}{2E}$ (c) $\frac{2E}{v^2l}$ (d) $\frac{v^2l}{E}$

132. An electron of mass 'm' and charge 'q' is accelerated from rest in a uniform electric field of strength 'E'. The velocity acquired by the electron, when it travels a distance 'L', is

MHT CET 2023 · 11 MAY · SHIFT 2

(a) $\sqrt{\frac{2q\,m}{mL}}$ (b) $\sqrt{\frac{2qEL}{m}}$ (c) $\sqrt{\frac{2Em}{qL}}$ (d) $\sqrt{\frac{qE}{mL}}$

133. An electron of mass 'm' and charge 'q' is accelerated from rest in a uniform electric field of strength 'E'. The velocity acquired by the electron when it travels a distance 'L' is

MHT CET 2021 · 22 SEP · SHIFT 2

(a) $\sqrt{\frac{2qE}{mL}}$ (b) $\sqrt{\frac{2Em}{qL}}$ (c) $\sqrt{\frac{2qEL}{m}}$ (d) $\times\sqrt{\frac{qE}{mL}}$

134. Two particles A and B having same mass have charge $+q$ and $+4q$ respectively. When they are allowed to fall from rest through same electric potential difference, the ratio of their speeds 'V_A' to 'V_B' will become

MHT CET 2021 · 22 SEP · SHIFT 2

(a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 4 : 1

135. A charge of magnitude '2e' and mass '4m' is moving in an electric field $\vec{E}$. The acceleration imparted to the above charge is

MHT CET 2021 · 20 SEP · SHIFT 1

(a) $\frac{2m}{3Ee}$ (b) $\frac{Ee}{2m}$ (c) $\frac{2Ee}{3m}$ (d) $\frac{3m}{2Ee}$

136. A particle of mass m and charge q is placed at rest in a uniform electric field E and then released. The kinetic energy attained by the particle after moving a distance y is

AIPMT 1998

(a) qEy^2 (b) qE^2y (c) qEy (d) q^2Ey

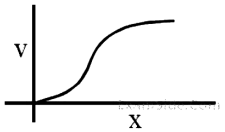
137. A vertical electric field of magnitude 4.9×10^5 N/C just prevents a water droplet of a mass 0.1 g from falling. The value of charge on the droplet will be:
(Given: g = 9.8 m/s^2)

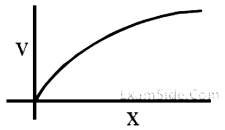
JEE MAIN 2022 · 24 JUN · SHIFT 1

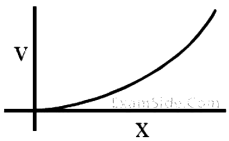
(a) 1.6×10^{-9} C (b) 2.0×10^{-9} C
(c) 3.2×10^{-9} C (d) 0.5×10^{-9} C

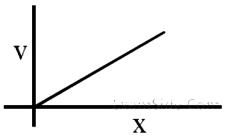
138. A particle of mass m and charge q is released from rest in a uniform electric field. If there is no other force on the particle, the dependence of its speed v on the distance x travelled by it is correctly given by (graphs are schematic and not drawn to scale)

JEE MAIN 2020 · 8 JAN · SHIFT 2

(a) 

(b) 

(c) 

(d) 

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139. A charged oil drop is suspended in a uniform field of $3 \times 10^4\ v/m$ so that it neither falls nor rises. The charge on the drop will be (Take the mass of the charge $= 9.9 \times 10^{-15}\ kg$ and $g = 10\, m/s^2$)

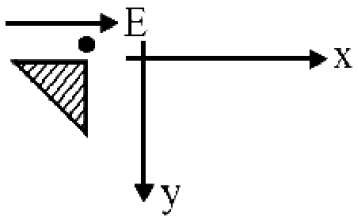
AIEEE 2004

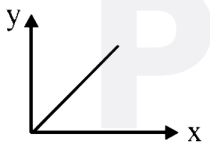
(a) $1.6 \times 10^{-18}\, C$ (b) $3.2 \times 10^{-18}\, C$
(c) $3.3 \times 10^{-18}\, C$ (d) $4.8 \times 10^{-18}\, C$

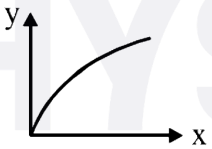
◆ Deflection across a field 2 Qs

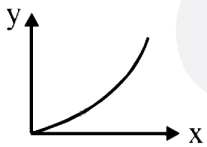
140. A small point mass carrying some positive charge on it, is released from the edge of a table. There is a uniform electric field in this region in the horizontal direction. Which of the following options then correctly describe the trajectory of the mass?
(Curves are drawn schematically and are not to scale).

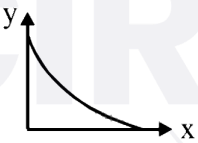
JEE MAIN 2020 · 2 SEP · SHIFT 2



(a)


(b)


(c)


(d)


141. A uniform electric field $\vec{E}$ exists between the plates of a charged condenser. A charged particle enters the space between the plates and perpendicular to $\vec{E}$. The path of the particle between the plates is a:

JEE MAIN 2013 · 9 APR · SHIFT 1

(a) straight line (b) hyperbola
(c) parabola (d) circle

◆ Charged pendulum & oscillations 1 Q

142. The bob of a simple pendulum has mass 2g and a charge of 5.0 μC. It is at rest in a uniform horizontal electric field of intensity 2000 V/m. At equilibrium, the angle that the pendulum makes with the vertical is: (take g = 10 m/s^2)

JEE MAIN 2019 · 8 APR · SHIFT 1

(a) $\tan^{-1}(5.0)$ (b) $\tan^{-1}(2.0)$
(c) $\tan^{-1}(0.5)$ (d) $\tan^{-1}(0.2)$

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TOPIC 05

Electric Potential & Equipotentials

57 PYQs · Easy 57 · Medium 0 · Difficult 0 | MHT CET 18 · NEET 18 · JEE 21

Concepts covered: Potential of point charges (10) · Zero-potential points (4) · Potential of ring, sphere & shell (13) · Spheres: concentric, connected & drops (13) · Relation between E and V (10) · Equipotential surfaces (7)

LEVEL 1 · EASY 57 questions

◆ Potential of point charges 10 Qs

143. A charge Q is placed at each corner of a cube of side r. The potential at the centre of the cube is (ϵ_0 = permittivity of free space)

MHT CET 2026 · 20 APR · SHIFT 2

(a) $\frac{4Q}{\pi\epsilon_0 r\sqrt{3}}$ (b) $\frac{8Q}{\pi\epsilon_0 r\sqrt{3}}$ (c) $\frac{16Q}{3\pi\epsilon_0 r}$ (d) $\frac{32Q}{\pi\epsilon_0 r\sqrt{3}}$

144. A regular hexagon of side 6 cm has a charge of 2μC at each of its vertices, what is the potential at the centre of the hexagon?

$\left[\frac{1}{4\pi\varepsilon_0} = 9\times10^9 \text{ SI unit}\right]$

MHT CET 2025 · 23 APR · SHIFT 1

(a) 1.5×10^5 V (b) 1.8×10^6 V
(c) 2.4×10^5 V (d) 3.2×10^6 V

145. A regular hexagon of side 10 cm has a charge 1μC at each of its vertices. The potential at the centre of hexagon is $\left[\frac{1}{4\pi\varepsilon_0} = 9\times10^9 \text{ SI unit}\right]$

MHT CET 2024 · 3 MAY · SHIFT 2

(a) 1.8×10^5 volt (b) 3.6×10^5 volt
(c) 5.4×10^5 volt (d) 7.2×10^5 volt

146. Four point charges each +q is placed on the circumference of a circle of diameter 2 d in such a way that they form a square. The potential at the centre is proportional to

MHT CET 2024 · 2 MAY · SHIFT 2

(a) $\frac{q^2}{d^2}$ (b) $\frac{q}{d}$ (c) $\frac{d}{q}$ (d) $\frac{d^2}{q^2}$

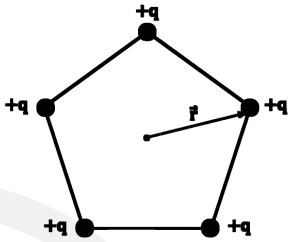
147. The value of electric potential at a distance of 9 cm from the point charge 4×10^{-7}C is [Given $\frac{1}{4\pi\varepsilon_0} = 9\times10^9 \text{ N m}^2\text{C}^{-2}$]:

NEET 2024

(a) 4×10^2 V (b) 44.4 V
(c) 4.4×10^5 V (d) 4×10^4 V

148. Five positive charges each having charge q are placed at the vertices of a pentagon as shown in the figure. The electric potential (V) and the electric field ($\vec{E}$) at the center O of the pentagon due to these five positive charges are:

JEE MAIN 2026 · 22 JAN · SHIFT 2



(a) $V = \frac{5q}{4\pi\varepsilon_o r}$ and $\vec{E} = \frac{5\sqrt{3}q}{8\pi\varepsilon_o r^2}\hat{r}$
(b) $V = \frac{5q}{4\pi\varepsilon_o r}$ and $\vec{E} = 0$
(c) $V = 0$ and $\vec{E} = 0$
(d) $V = \frac{5q}{4\pi\varepsilon_o r}$ and $\vec{E} = \frac{5q}{4\pi\varepsilon_o r^2}\hat{r}$

149. An electric charge $10^{-6}\mu$C is placed at origin $(0,0)$ m of X − Y co-ordinate system. Two points P and Q are situated at $(\sqrt{3},\sqrt{3})$m and $(\sqrt{6},0)$m respectively. The potential difference between the points P and Q will be:

JEE MAIN 2024 · 27 JAN · SHIFT 1

(a) $\sqrt{3}$ V (b) $\sqrt{6}$ V (c) 0 V (d) 3 V

150. Electric potential at a point 'P' due to a point charge of 5×10^{-9}C is 50 V. The distance of 'P' from the point charge is:

(Assume, $\frac{1}{4\pi\varepsilon_0} = 9\times10^{+9}\text{ Nm}^2\text{C}^{-2}$)

JEE MAIN 2023 · 8 APR · SHIFT 2

(a) 0.9 cm (b) 90 cm (c) 3 cm (d) 9 cm

151. An electric charge $10^{-3}\ \mu C$ is placed at the origin $(0,0)$ of $X-Y$ co-ordinate system. Two points A and B are situated at $\left(\sqrt{2},\sqrt{2}\right)$ and $(2,0)$ respectively. The potential difference between the points A and B will be

AIEEE 2007

(a) 4.5 volts (b) 9 volts
(c) zero (d) 2 volts

152. On moving a charge of 20 coulomb by 2 cm, 2 J of work is done, then the potential difference between the points is

AIEEE 2002

(a) 0.1 V (b) 8 V (c) 2V (d) 0.5 V.

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◆ Zero-potential points 4 Qs

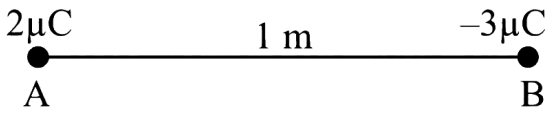
153. Charges of $2\mu C$ and $-3\mu C$ are placed at two points A and B separated by distance of 1 m. The distance of the point from A where net potential is zero is

MHT CET 2025 · 26 APR · SHIFT 1

(a) 0.667 m (b) 0.5 m (c) 0.4 m (d) 0.6 m

154. Charges of $2\mu C$ and $-3\mu C$ are placed at two points A and B separated by 1 m. The distance of the point from A, where net potential is zero, is

MHT CET 2024 · 15 MAY · SHIFT 2



(a) 0.7 m (b) 0.5 m (c) 0.4 m (d) 0.6 m

155. Four point charges $-Q$, $-q$, $2q$ and $2Q$ are placed, one at each corner of the square. The relation between Q and q for which the potential at the centre of the square is zero is

AIPMT 2012 · PRELIMS

(a) $Q = -q$ (b) $Q = -\frac{1}{q}$ (c) $Q = q$ (d) $Q = \frac{1}{q}$

156. Considering a group of positive charges, which of the following statements is correct?

JEE MAIN 2023 · 31 JAN · SHIFT 2

(a) Net potential of the system cannot be zero at a point but net electric field can be zero at that point
(b) Net potential of the system at a point can be zero but net electric field can't be zero at that point.
(c) Both the net potential and the net electric field cannot be zero at a point.
(d) Both the net potential and the net field can be zero at a point.

◆ Potential of ring, sphere & shell 13 Qs

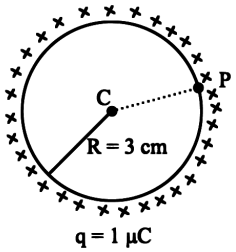
157. A conducting sphere of radius ' R ' is given a charge ' Q ' uniformly. The electric field and the electric potential at the centre of the sphere are respectively [ε_0 = permittivity of free space]

MHT CET 2025 · 20 APR · SHIFT 1

(a) zero and $\frac{Q}{4\pi\varepsilon_0 R}$ (b) $\frac{Q}{4\pi\varepsilon_0 R^2}$ and zero
(c) $\frac{Q}{4\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi\varepsilon_0 R^2}$ (d) zero and zero

158. A thin spherical shell is charged by some source. The potential difference between the two points C and P (in V) shown in the figure is:
(Take $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ SI units)

NEET 2024



(a) 3×10^5 (b) 1×10^5
(c) 0.5×10^5 (d) Zero

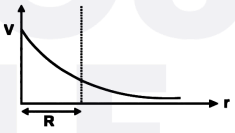
159. If a conducting sphere of radius R is charged. Then the electric field at a distance $r(r > R)$ from the centre of the sphere would be, (V = potential on the surface of the sphere)

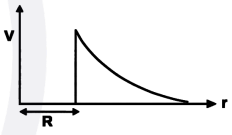
NEET 2023

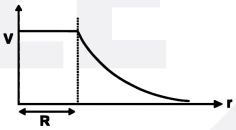
(a) $\frac{rV}{R^2}$ (b) $\frac{R^2V}{r^3}$ (c) $\frac{RV}{r^2}$ (d) $\frac{V}{r}$

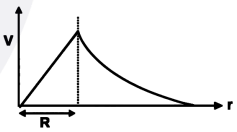
160. The variation of electrostatic potential with radial distance r from the centre of a positively charged metallic thin shell of radius R is given by the graph

NEET 2020 · PHASE 2

(a) 

(b) 

(c) 

(d) 

161. A conducting sphere of radius R is given a charge Q. The electric potential and the electric field at the centre of the sphere rrespectively are

AIPMT 2014

(a) zero and $\frac{Q}{4\pi\varepsilon_0 R^2}$ (b) $\frac{Q}{4\pi\varepsilon_0 R}$ and zero
(c) $\frac{Q}{4\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi\varepsilon_0 R^2}$ (d) both are zero

162. Some charge is being given to a conductor. Then its potential is

AIPMT 2002

(a) maximum at surface
(b) maximum at centre
(c) remain same throughout the conductor
(d) maximum somewhere between surface and centre.

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163. A hollow metallic sphere of radius 10 cm is charged such that potential of its surface is 80 V. The potential at the centre of the sphere would be

AIPMT 1994

(a) 80 V (b) 800 V (c) zero (d) 8 V

164. Given below are two statements: one is labelled as Assertion **A** and the other is labelled as Reason **R**

Assertion A: Work done in moving a test charge between two points inside a uniformly charged spherical shell is zero, no matter which path is chosen.

Reason R: Electrostatic potential inside a uniformly charged spherical shell is constant and is same as that on the surface of the shell.

In the light of the above statements, choose the correct answer from the options given below.

JEE MAIN 2025 · 8 APR · SHIFT 2

(a) A is true but R is false
(b) Both A and R are true and R is the correct explanation of A
(c) Both A and R are true but R is NOT the correct explanation of A
(d) A is false but R is true

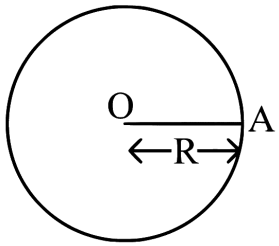
165. The electrostatic potential on the surface of uniformly charged spherical shell of radius R = 10 cm is 120 V. The potential at the centre of shell, at a distance r = 5 cm from centre, and at a distance r = 15 cm from the centre of the shell respectively, are:

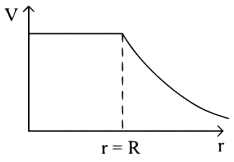
JEE MAIN 2025 · 3 APR · SHIFT 1

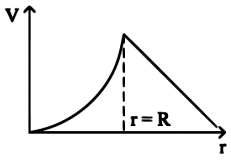
(a) 0 V, 120 V, 40 V (b) 120 V, 120 V, 80 V
(c) 40 V, 40 V, 80 V (d) 0 V, 0 V, 80 V

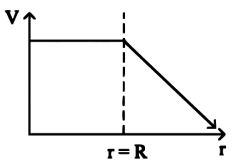
166. For a uniformly charged thin spherical shell, the electric potential (V) radially away from the centre (O) of shell can be graphically represented as -

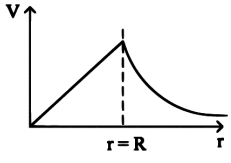
JEE MAIN 2023 · 6 APR · SHIFT 1



(a) 

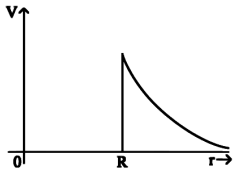
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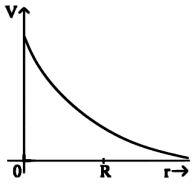
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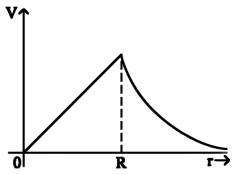
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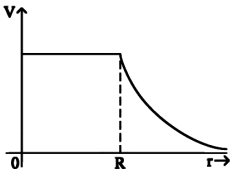
167. Which of the following correctly represents the variation of electric potential (V) of a charged spherical conductor of radius (R) with radial distance (r) from the center?

JEE MAIN 2023 · 31 JAN · SHIFT 1

(a) 

(b) 

(c) 

(d) 

168. A thin spherical conducting shell of radius R has a charge q. Another charge Q is placed at the center of the shell. The electrostatic potential at a point P at a distance $\frac{R}{2}$ from the center of the shell is

AIEEE 2003

(a) $\frac{2Q}{4\pi\varepsilon_0 R}$ (b) $\frac{2Q}{4\pi\varepsilon_0 R} - \frac{2q}{4\pi\varepsilon_0 R}$
(c) $\frac{2Q}{4\pi\varepsilon_0 R} + \frac{q}{4\pi\varepsilon_0 R}$ (d) $\frac{(q+Q)2}{4\pi\varepsilon_0 R}$

169. The electric potential at the surface of an atomic nucleus $(z = 50)$ of radius 9×10^{-13} cm is _____ $\times 10^6$ V.

JEE MAIN 2024 · 27 JAN · SHIFT 2 *(Numerical)*

◆ Spheres: concentric, connected & drops 13 Qs

170. 'n' small spherical drops of the same size which are charged to 'V' volt each coalesce to form a single big drop. The potential of a big drop is

MHT CET 2026 · 19 APR · SHIFT 1

(a) nV (b) $\frac{V}{n}$ (c) $\left(n^{\frac{1}{3}}\right)V$ (d) $\left(n^{\frac{2}{3}}\right)V$

171. Assuming the drops to be spherical, 27 identical drops of mercury are charged simultaneously to the same potential of 20 volt. If all the charged drops are made to combine to form one big drop, then potential of big drop will be

MHT CET 2025 · 25 APR · SHIFT 2

(a) 90 V (b) 180 V (c) 270 V (d) 360 V

172. ' n ' identical small spherical drops of water, each of radius ' r ' and charged to the same potential ' v ' are combined to form a big drop. The potential of a big drop is

MHT CET 2025 · 25 APR · SHIFT 1

(a) nv (b) $n\sqrt{v}$ (c) $n^{1/3}v$ (d) $n^{2/3}v$

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173. ' n ' small spherical drops of same size which are charged to ' V ' volt each coalesce to form a single big drop. The potential of the big drop is
MHT CET 2025 · 20 APR · SHIFT 1
(a) $\frac{V}{n}$ (b) $n \cdot V$ (c) $n^{1/3} \cdot V$ (d) $n^{2/3} \cdot V$

174. ' n ' small drops of same size are charged to ' V ' volt each. If they coalesce to form a single large drop, then its potential will be
MHT CET 2024 · 16 MAY · SHIFT 2
(a) $Vn^{\frac{1}{3}}$ (b) $Vn^{\frac{2}{3}}$ (c) Vn (d) Vn^{-1}

175. Two hollow conducting spheres of radii R_1 and R_2 ($R_1 >> R_2$) have equal charges. The potential would be
NEET 2022 · PHASE 1
(a) More on bigger sphere
(b) More on smaller sphere
(c) Equal on both the spheres
(d) Dependent on the material property of the sphere

176. Two charged spherical conductors of radius R_1 and R_2 are connected by a wire. Then the ratio of surface charge densities of the spheres (σ_1 / σ_2) is:
NEET 2021
(a) $\frac{R_1^2}{R_2^2}$ (b) $\frac{R_1}{R_2}$ (c) $\frac{R_2}{R_1}$ (d) $\sqrt{\left(\frac{R_1}{R_2}\right)}$

177. Twenty seven drops of same size are charged at 220V each. They combine to form a bigger drop. Calculate the potential of the bigger drop.
NEET 2021
(a) 1980 V (b) 660 V (c) 1320 V (d) 1520 V

178. Three small identical bubbles of water having same charge on each coalesce to form a bigger bubble. Then the ratio of the potentials on one initial bubble and that on the resultant bigger bubble is:
JEE MAIN 2026 · 22 JAN · SHIFT 2
(a) $1 : 3^{2/3}$ (b) $3^{2/3} : 1$ (c) $1 : 3^{1/3}$ (d) $1 : 2^{2/3}$

179. Two charged conducting spheres of radii a and b are connected to each other by a conducting wire. The ratio of charges of the two spheres respectively is:
JEE MAIN 2024 · 8 APR · SHIFT 1
(a) ab (b) $\frac{b}{a}$ (c) $\frac{a}{b}$ (d) $\sqrt{ab}$

180. 64 identical drops each charged upto potential of 10 mV are combined to form a bigger drop. The potential of the bigger drop will be _____ mV.
JEE MAIN 2023 · 12 APR · SHIFT 1 *(Numerical)*

181. 27 identical drops are charged at 22V each. They combine to form a bigger drop. The potential of the bigger drop will be _____ V.
JEE MAIN 2022 · 25 JUN · SHIFT 2 *(Numerical)*

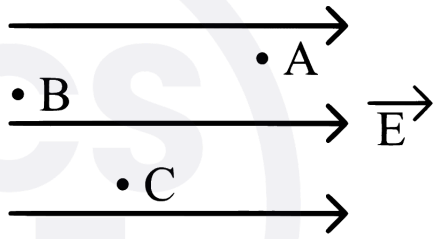
182. 512 identical drops of mercury are charged to a potential of 2V each. The drops are joined to form a single drop. The potential of this drop is _____ V.
JEE MAIN 2021 · 25 FEB · SHIFT 1 *(Numerical)*

◆ Relation between E and V 10 Qs

183. The electric potential ' V ' is given as a function of distance ' x ' (metre) by $V = (4x^2 + 8x - 3)V$. The value of electric field at $x = 0.5$ m, in V/m is
MHT CET 2025 · 19 APR · SHIFT 2
(a) -16 (b) -12 (c) 0 (d) +12

184. When a charge of 3 C is placed in uniform electric field, it experiences a force of 3000 N. Within this field, potential difference between two points separated by a distance of 1 cm is
MHT CET 2023 · 9 MAY · SHIFT 2
(a) 10 V (b) 90 V (c) 1000 V (d) 3000 V

185. Let A, B and C be the three points in a uniform electric field ($\vec{E}$) as shown. The electric potential is
MHT CET 2021 · 24 SEP · SHIFT 1



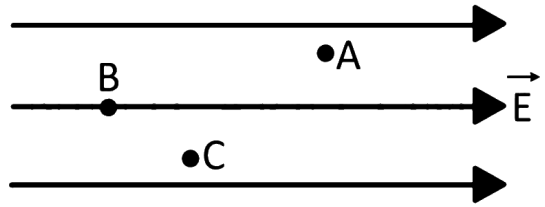
(a) maximum at point C
(b) maximum at point A
(c) maximum at point B
(d) same at all points A, B and C

186. In a certain region of space with volume 0.2 m^3, the electric potential is found to be 5 V throughout. The magnitude of electric field in this region is:
NEET 2020 · PHASE 1
(a) 0.5 N/C (b) 1 N/C (c) 5 N/C (d) zero

187. If potential (in volts) in a region is expressed as V(x, y, z) = 6xy – y + 2yz, the electric field (in N/C) at point (1, 1, 0) is
AIPMT 2015
(a) $-\left(2\hat{i} + 3\hat{j} + \hat{k}\right)$ (b) $-\left(6\hat{i} + 9\hat{j} + \hat{k}\right)$
(c) $-\left(3\hat{i} + 5\hat{j} + 3\hat{k}\right)$ (d) $-\left(6\hat{i} + 5\hat{j} + 2\hat{k}\right)$

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188. A, B and C are three points in a uniform electric field. The electric potential is
NEET 2013



(a) maximum at C
(b) same at all the three points A, B and C
(c) maximum at A
(d) maximum at B

189. The electric potential V at any point (x, y, z), all in metres in space is given by $V = 4x^2$ volt. The electric field at the point (1, 0, 2) in volt/meter, is
AIPMT 2011 · MAINS
(a) 8 along negative X-axis
(b) 8 along positive X-axis
(c) 16 along negative X-axis
(d) 16 along positive X-axis

190. The electric potential at a point (x, y, z) is given by $V = -x^2y - xz^3 + 4$
The electric field at that point is
AIPMT 2009
(a) $\vec{E} = \hat{i}2xy + \hat{j}\left(x^2 + y^2\right) + \hat{k}\left(3xz - y^2\right)$
(b) $\vec{E} = \hat{i}z^3 + \hat{j}xyz + \hat{k}z^2$
(c) $\vec{E} = \hat{i}\left(2xy - z^3\right) + \hat{j}xy^2 + \hat{k}3z^2x$
(d) $\vec{E} = \hat{i}\left(2xy + z^3\right) + \hat{j}x^2 + \hat{k}3xz^2$

191. The electric potential as a function of x, y is given by $V = 5\left(x^2 - y^2\right)V$. The electric field at a point $(2, 3)$m is ____ V/m.
JEE MAIN 2026 · 6 APR · SHIFT 2
(a) $(-20\hat{i} + 30\hat{j})$ (b) $(20\hat{i} - 30\hat{j})$
(c) $(20\hat{i} + 45\hat{j})$ (d) $(-4\hat{i} + 6\hat{j})$

192. If the electric potential at any point (x, y, z) m in space is given by $V = 3x^2$ volt. The electric field at the point (1, 0, 3) m will be:
JEE MAIN 2022 · 29 JUN · SHIFT 2
(a) 3 Vm^{-1}, directed along positive x-axis.
(b) 3 Vm^{-1}, directed along negative x-axis.
(c) 6 Vm^{-1}, directed along positive x-axis.
(d) 6 Vm^{-1}, directed along negative x-axis.

◆ Equipotential surfaces 7 Qs

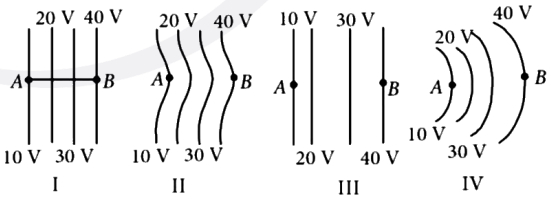
193. If charge $+q$ is taken from one point to another over an equipotential surface, then
MHT CET 2026 · 20 APR · SHIFT 2
(a) work done on the charge continuously increases.
(b) work is done by the charge.
(c) work done on the charge is constant.
(d) no work is done.

194. Which of the following statements is NOT TRUE?
a. Work done to move a charge on an equipotential surface is not zero.
b. Equipotential surfaces are the surfaces where the potential is constant.
c. Equipotential surfaces for a uniform electric field are parallel and equidistant from each other. d. Electric field is always perpendicular to an equipotential surface.
MHT CET 2026 · 11 APR · SHIFT 1
(a) c (b) a (c) d (d) b

195. If a unit charge is taken from one point to another point over an equipotential surface, then
MHT CET 2024 · 10 MAY · SHIFT 2
(a) work is done on the charge.
(b) work is done by the charge.
(c) work done on the charge is constantly increasing.
(d) work done to move a charge is zero.

196. The angle between the electric lines of force and the equipotential surface is
NEET 2022 · PHASE 1
(a) 0° (b) 45° (c) 90° (d) 180°

197. The diagrams below show regions of equipotentials.



A positive charge is moved from A to B in each diagram.
NEET 2017
(a) In all the four cases the work done is the same.
(b) Minimum work is required to move q in figure(I).
(c) Maximum work is required to move q in figure (II).
(d) Maximum work is required to move q in figure (III)

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198. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Work done by electric field on moving a positive charge on an equipotential surface is always zero.

Reason (R): Electric lines of forces are always perpendicular to equipotential surfaces. In the light of the above statements, choose the most appropriate answer from the options given below:

JEE MAIN 2024 · 27 JAN · SHIFT 2

(a) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(b) (A) is correct but (R) is not correct
(c) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(d) (A) is not correct but (R) is correct

---

199. This question has Statement-1 and Statement-2. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement 1: No work is required to be done to move a test charge between any two points on an equipotential surface.

Statement 2: Electric lines of force at the equipotential surfaces are mutually perpendicular to each other.

JEE MAIN 2013 · 25 APR · SHIFT 1

(a) Statement 1 is true, Statement 2 is true, Statement 2 is the correct explanation of Statement 1.
(b) Statement 1 is true, Statement 2 is true, Statement 2 is not the correct explanation of Statement 1.
(c) Statement 1 is true, Statement 2 is false.
(d) Statement 1 is false, Statement 2 is true.

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TOPIC 06

Electrostatic Potential Energy

21 PYQs · Easy 21 · Medium 0 · Difficult 0 | MHT CET 9 · NEET 7 · JEE 5

Concepts covered: PE of a system of charges (4) · Work done & electron volt (17)

LEVEL 1 · EASY 21 questions

◆ PE of a system of charges 4 Qs

200. Three equal $(+q)$ charges are placed in air at the vertices of equilateral triangle. If the side of equilateral triangle is l, the net potential energy of the system is $\left[K=\frac{1}{4\pi\epsilon_0}\right]$

MHT CET 2026 · 20 MAY · SHIFT 1

(a) $\frac{kq^2}{l}$ (b) $\frac{2kq^2}{l}$ (c) $\frac{3kq^2}{l}$ (d) $\frac{4kq^2}{l}$

201. If a unit positive charge is shifted from a region of low potential to a region of high potential, then the electric potential energy of the system

MHT CET 2024 · 15 MAY · SHIFT 1

(a) increases. (b) decreases.
(c) does not change. (d) is zero.

202. In bringing an electron towards another electron, the electrostatic potential energy of the system

AIPMT 1999

(a) decreases (b) increases
(c) remains same (d) becomes zero

203. Two charges $7\mu c$ and $-4\mu c$ are placed at $(-7\text{ cm}, 0, 0)$ and $(7\text{ cm}, 0, 0)$ respectively. Given, $\epsilon_0 = 8.85\times10^{-12}\text{C}^2\,\text{N}^{-1}\ \text{m}^{-2}$, the electrostatic potential energy of the charge configuration is:

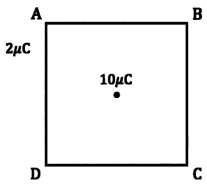
JEE MAIN 2025 · 23 JAN · SHIFT 2

(a) -2.0 J (b) -1.5 J (c) -1.2 J (d) -1.8 J

◆ Work done & electron volt 17 Qs

204. A charge $10\ \mu C$ exists at the centre of a square. The work done in moving a $2\ \mu C$ point charge from corner A to corner B of a square ABCD is

MHT CET 2026 · 15 MAY · SHIFT 1



(a) zero (b) 5 J (c) 2 J (d) 20 J

205. If 100 J of work has to be done in moving an electric charge of 4 C from a place, where potential is -10 V to another place where potential is V volt. The value of V is

MHT CET 2026 · 13 MAY · SHIFT 1

(a) 5 V (b) 10 V (c) 25 V (d) 15 V

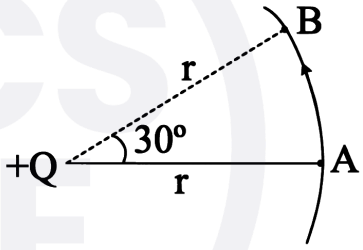
206. Let ' W ' joule be the work done to move an electric charge ' q ' coulomb from a place A, where potential is -5 volt to another place B where potential is ' V ' volt. The value of ' V ' is

MHT CET 2025 · 19 APR · SHIFT 1

(a) $Wq-5$ (b) $\frac{q}{w}+5$ (c) $W-\frac{5}{q}$ (d) $\frac{w}{q}-5$

207. In an electric field due to charge Q, a charge q moves from point A to B as shown in the figure. The work done is (ε_0 = permittivity of free space)

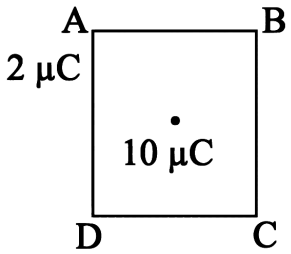
MHT CET 2024 · 15 MAY · SHIFT 2



(a) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{r^2}$ (b) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{r^2}\frac{\pi}{6}$
(c) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{r}$ (d) zero

208. If a 10μC charge exists at the centre of a square, the work done in moving a 2μC point charge from corner A to corner B of a square ABCD is

MHT CET 2024 · 4 MAY · SHIFT 2



(a) Zero (b) 5 (c) 2 (d) 20

209. 90 J of work is done to move an electric charge of magnitude 3 C from a place A, where potential is -10 V to another place B, where potential is ' V_1 ' volt. The value of V_1 is

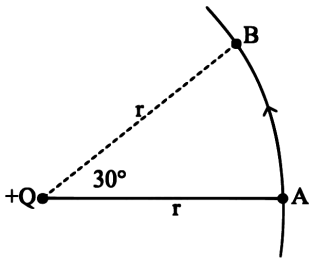
MHT CET 2024 · 2 MAY · SHIFT 1

(a) 10 V (b) 20 V (c) 30 V (d) –40 V

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210. In the electric field due to a charge Q, a charge q moves from point A to B. The work done is (ε_0 = permittivity of vacuum)

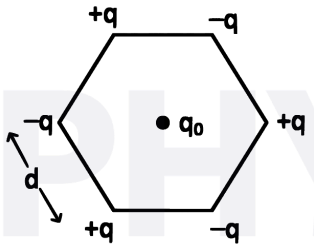
MHT CET 2023 · 13 MAY · SHIFT 2



(a) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{r^2}$ (b) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{r}\times\frac{\pi}{6}$
(c) $\frac{1}{4\pi\varepsilon_0}\frac{Qq}{r}$ (d) Zero

211. Six charges +q, −q, +q, −q, +q, and − q are fixed at the corners of a hexagon of side d as shown in the figure. The work done in bringing a charge q_0 to the centre of the hexagon from infinity is (ε_0 - permittivity of free space)

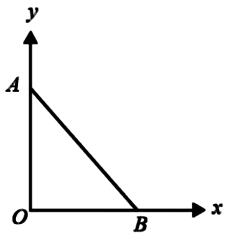
NEET 2022 · PHASE 2



(a) $\frac{-q^2}{4\pi\varepsilon_0 d}\left(6-\frac{1}{\sqrt{2}}\right)$ (b) Zero
(c) $\frac{-q^2}{4\pi\varepsilon_0 d}$ (d) $\frac{-q^2}{4\pi\varepsilon_0 d}\left(3-\frac{1}{\sqrt{2}}\right)$

212. As per the diagram a point charge +q is placed at the origin O. Work done in taking another point charge – Q from the point A [coordinates $(0, a)$] to another point B

AIPMT 2005



(a) zero (b) $\left(\frac{qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right).\sqrt{2}a$
(c) $\left(\frac{-qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right).\sqrt{2}a$ (d) $\left(\frac{qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right).\frac{a}{\sqrt{2}}$

213. A bullet of mass 2 g is having a charge of 2 μC. Through what potential difference must it be accelerated, starting from rest, to acquire a speed of 10 m/s?

AIPMT 2004

(a) 5 kV (b) 50 kV (c) 5 V (d) 50 V

214. When a proton is accelerated through 1 V its kinetic energy will be

AIPMT 1999

(a) 1540 eV (b) 13.6 eV (c) 1 eV (d) zero

215. There is an electric field E in x-direction. If the work done on moving a charge of 0.2 C through a distance of 2 m along a line making an angle 60° with x-axis is 4 J, then what is the value of E?

AIPMT 1995

(a) 5 N/C (b) 20 N/C (c) $\sqrt{3}$ N/C (d) 4 N/C

216. Charge q_2 is at the centre of a circular path with radius r. Work done in carrying charge q_1, once around this equipotential path, would be

AIPMT 1994

(a) $\frac{1}{4\pi\varepsilon_0}\times\frac{q_1q_2}{r^2}$ (b) $\frac{1}{4\pi\varepsilon_0}\times\frac{q_1q_2}{r}$
(c) zero (d) infinite

217. Two point charges of 1 nC and 2 nC are placed at the two corners of equilateral triangle of side 3 cm. The work done in bringing a charge of 3 nC from infinity to the third corner of the triangle is ____ μJ.

$\frac{1}{4\pi\epsilon_0}=9\times10^9\ \text{N}\cdot\text{m}^2/\text{C}^2$

JEE MAIN 2026 · 28 JAN · SHIFT 1

(a) 3.3 (b) 27 (c) 2.7 (d) 5.4

218. A point charge of 10^{-8}C is placed at origin. The work done in moving a point charge 2μC from point $A(4,4,2)$m to $B(2,2,1)$m is ____ J. $\left(\frac{1}{4\pi\epsilon_o}=9\times10^9\right.$ in SI units)

JEE MAIN 2026 · 21 JAN · SHIFT 1

(a) 30×10^{-6} (b) 0
(c) 15×10^{-6} (d) 45×10^{-6}

219. A point charge 2×10^{-2} C is moved from P to S in a uniform electric field of $30\,\text{NC}^{-1}$ directed along positive x-axis. If coordinates of P and S are (1, 2, 0) m and (0, 0, 0) m respectively, the work done by electric field will be

JEE MAIN 2023 · 29 JAN · SHIFT 2

(a) 600 mJ (b) −1200 mJ
(c) 1200 mJ (d) −600 mJ

220. Two points P and Q are maintained at the potentials of 10 V and $-4\,V$, respectively. The work done in moving 100 electrons from P to Q is:

AIEEE 2009

(a) $9.60\times10^{-17}J$ (b) $-2.24\times10^{-16}J$
(c) $2.24\times10^{-16}J$ (d) $-9.60\times10^{-17}J$

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TOPIC 07

Electric Dipole

51 PYQs · Easy 51 · Medium 0 · Difficult 0 | MHT CET 20 · NEET 15 · JEE 16

Concepts covered: Dipole moment, field & potential (12) · Dipole in a uniform field (25) · Dipole in non-uniform field & dipole-dipole (2) · Polar molecules & dielectrics (12)

LEVEL 1 · EASY 51 questions

◆ Dipole moment, field & potential 12 Qs

221. The electric potential at a point on the axis of an electric dipole is proportional to [r = distance between centre of the electric dipole and the point]

MHT CET 2024 · 10 MAY · SHIFT 2

(a) $\frac{1}{r}$ (b) $\frac{1}{r^2}$ (c) r (d) $\frac{1}{r^3}$

222. If E_a and E_q represent the electric field intensity due to a short dipole at a point on its axial line and on the equatorial line at the same distance 'r' from the centre of the dipole, then

MHT CET 2023 · 14 MAY · SHIFT 2

(a) $E_a = E_q$ (b) $E_a = \frac{1}{2}E_q$
(c) $E_a = \frac{1}{\sqrt{2}}E_q$ (d) $E_a = 2E_q$

223. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: The potential (V) at any axial point, at 2 m distance (r) from the centre of the dipole of dipole moment vector $\vec{P}$ of magnitude, 4×10^{-6}Cm , is $\pm 9 \times 10^3$ V.

(Take $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$SI units)

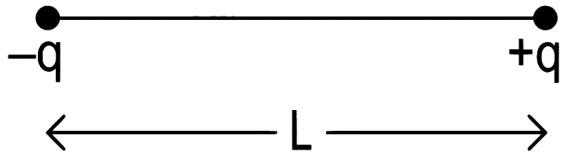
Reason R: $V = \pm\frac{2P}{4\pi\epsilon_0 r^2}$, where r is the distance of any axial point, situated at 2 m from the centre of the dipole.

In the light of the above statements, choose the correct answer from the options given below:

NEET 2024

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true and R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

224. 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 2022 · PHASE 1

(a) $\frac{1}{R^2}$ (b) $\frac{1}{R^3}$ (c) $\frac{1}{R^4}$ (d) $\frac{1}{R^6}$

225. The electric field at a point on the equatorial plane at a distance r from the centre of a dipole having dipole moment $\vec{p}$ is given by,

($r \gg$ separation of two charges forming the dipole, ε_0 - permittivity of free space)

NEET 2020 · PHASE 2

(a) $\vec{E} = -\frac{\vec{P}}{4\pi\varepsilon_0 r^3}$ (b) $\vec{E} = \frac{\vec{P}}{4\pi\varepsilon_0 r^3}$
(c) $\vec{E} = \frac{2\vec{P}}{4\pi\varepsilon_0 r^3}$ (d) $\vec{E} = -\frac{\vec{P}}{4\pi\varepsilon_0 r^2}$

226. A short electric dipole has a dipole moment of 16×10^{-9} Cm. The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of 60° with the dipole axis is:

$\left(\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2/C^2\right)$

NEET 2020 · PHASE 1

(a) 200 V (b) 400 V (c) zero (d) 50 V

227. A point Q lies on the perpendicular bisector of an electrical dipole of dipole moment p. If the distance of Q from the dipole is r (much larger than the size of the dipole) then electric field at Q is proportional to

AIPMT 1998

(a) p^{-1} and r^{-2} (b) p and r^{-2}
(c) p^2 and r^{-3} (d) p and r^{-3}

228. 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 · 24 JAN · SHIFT 1

(a) $2qa(7\hat{i} - 3\hat{j})$ (b) $2qa(3\hat{j} - 7\hat{i})$
(c) $2qa(3\hat{i} - 7\hat{j})$ (d) $2qa(3\hat{j} - \hat{i})$

229. The electrostatic potential due to an electric dipole at a distance 'r' varies as:

JEE MAIN 2024 · 30 JAN · SHIFT 1

(a) $\frac{1}{r^3}$ (b) $\frac{1}{r}$ (c) $\frac{1}{r^2}$ (d) r

230. The electric field due to a short electric dipole at a large distance (r) from center of dipole on the equatorial plane varies with distance as:

JEE MAIN 2023 · 15 APR · SHIFT 1

(a) $\frac{1}{r^2}$ (b) $\frac{1}{r}$ (c) r (d) $\frac{1}{r^3}$

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231. A point dipole $\vec{p} = -p_0\hat{x}$ is kept at the origin. The potential and electric field due to this dipole on the y-axis at a distance d are, respectively: (Take V= 0 at infinity)

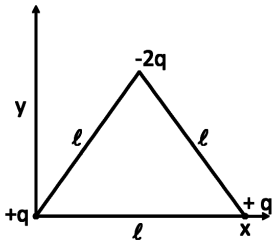
JEE MAIN 2019 · 12 APR · SHIFT 1

(a) $\frac{|\vec{p}|}{4\pi\epsilon_0 d^2}, \frac{-\vec{p}}{4\pi\epsilon_0 d^3}$ (b) $0, \frac{\vec{p}}{4\pi\epsilon_0 d^3}$

(c) $\frac{|\vec{p}|}{4\pi\epsilon_0 d^2}, \frac{\vec{p}}{4\pi\epsilon_0 d^3}$ (d) $0, \frac{-\vec{p}}{4\pi\epsilon_0 d^3}$

232. Determine the electric dipole moment of the system of the three charges, placed on the vertices of an equilateral triangle, as shown in the figure:

JEE MAIN 2019 · 12 JAN · SHIFT 1



(a) $2q\ell\hat{j}$ (b) $(q\ell)\frac{\hat{i}+\hat{j}}{\sqrt{2}}$

(c) $\sqrt{3}\,q\ell\frac{\hat{j}-\hat{i}}{\sqrt{2}}$ (d) $-\sqrt{3}\,q\ell\hat{j}$

◆ Dipole in a uniform field 25 Qs

233. A dipole of electric dipole moment $\vec{P}$ is placed in an electric field of strength $\vec{E}$. The angle between $\vec{P}$ and $\vec{E}$ for which the potential energy of the electric dipole is maximum, is

MHT CET 2026 · 19 MAY · SHIFT 2

(a) $\cos^{-1}(1)$ (b) $\cos^{-1}(-1)$

(c) $\sin^{-1}(1)$ (d) $\sin^{-1}(-1)$

234. An electric dipole of length 3cm is placed with its axis making an angle of 60° with a uniform electric field of 5×10^4 N/C. It experiences a torque of $9\sqrt{3}$ Nm. The $= \frac{\sqrt{3}}{2}$)

magnitude of charge on the dipole is ($\sin 60^\circ$

MHT CET 2026 · 17 APR · SHIFT 1

(a) 0.6×10^{-2} C (b) 1.2×10^{-2} C

(c) 1.8×10^{-2} C (d) 2.4×10^{-2} C

235. An electric dipole of length $0.5\ \mu$m is placed with its axis making an angle of 30° with uniform electric field 10^4 V/m. If it experiences a torque of 5×10^{-9} Nm, the magnitude of the charge on the dipole is ($\sin 30^\circ = 0.5$)

MHT CET 2026 · 16 APR · SHIFT 2

(a) $1\ \mu$C (b) $1.5\ \mu$C (c) $2\ \mu$C (d) $2.5\ \mu$C

236. An electric dipole of length 2 cm is placed with its axis making an angle of 60° to a uniform electric field of 10^{+5} N/C. If it experiences a torque of $9\sqrt{3}$Nm, $= \frac{\sqrt{3}}{2}$)

the magnitude of the charge on the dipole is ($\sin 60^\circ$

MHT CET 2025 · 5 MAY · SHIFT 2

(a) 7×10^{-3}C (b) 8×10^{-3}C

(c) 9×10^{-3}C (d) $\frac{9}{2} \times 10^{-3}$C

237. An electric dipole having each charge of magnitude 2μC is placed in an electric field of intensity $8 \times 10^{+4}$ N/C. If the maximum torque acting on the dipole is 4×10^{-3} N − m, the length of the dipole is

MHT CET 2025 · 21 APR · SHIFT 1

(a) 10 mm (b) 25 mm (c) 15 mm (d) 20 mm

238. An electric dipole of dipole moment ' p ' is aligned parallel to a uniform electric field ' E '. The energy required to rotate the dipole by 90° is [$\sin 0^\circ = 0$, $\cos 0^\circ = 1$, $\sin 90^\circ = 1$ $\cos 90^\circ = 0$]

MHT CET 2025 · 19 APR · SHIFT 1

(a) pE (b) pE^2 (c) p^2E (d) infinity

239. An electric dipole will have minimum potential energy when it subtends an angle [$\cos 0^\circ = 1$ $\sin 0^\circ = 0$] [$\cos 90^\circ = 0$ $\cos \pi = -1$]

MHT CET 2024 · 11 MAY · SHIFT 2

(a) π with direction of field.

(b) $\frac{\pi}{2}$ with direction of field.

(c) $\frac{3\pi}{2}$ with direction of field.

(d) zero with direction of field.

240. An electric dipole consisting of two opposite charges of 2×10^{-6}C separated by a distance of 3 cm placed in an electric field of 2×10^5 N/C then the maximum torque acting on dipole is

MHT CET 2023 · 10 MAY · SHIFT 1

(a) 12×10^{-1} N − m (b) 24×10^{-3} N − m

(c) 12×10^{-3} N − m (d) 24×10^{-1} N − m

241. An electric dipole having dipole moment P = q × 2ℓ is placed in a uniform electric field 'E'. The dipole moment is along the direction of the field. The force acting on it and its potential energy are respectively

MHT CET 2021 · 20 SEP · SHIFT 1

(a) qE and minimum (b) qE and maximum

(c) 2qE and minimum (d) zero and minimum

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242. 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 2025

(a) 1.2 J (b) 1.5 J (c) 0.8 J (d) 1.0 J

243. An electric dipole is placed at an angle of 30° with an electric field of intensity $2 \times 10^5 \text{NC}^{-1}$. It experiences a torque equal to $4\,\text{N m}$. Calculate the magnitude of charge on the dipole, if the dipole length is $2\,\text{cm}$.

NEET 2023

(a) 6 mC (b) 4 mC (c) 2 mC (d) 8 mC

244. 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

(a) 8 mC (b) 2 mC (c) 5 mC (d) 7 μC

245. An electric dipole of dipole moment p is aligned parallel to a uniform electric field E. The energy required to rotate the dipole by 90° is

NEET 2013

(a) p^2 E (b) pE (c) infinity (d) pE^2

246. An electric dipole of moment p is placed in an electric field of intensity E. The dipole acquires a position such that the axis of the dipole makes an angle θ with the direction of the field. Assuming that the potential energy of the dipole to be zero when θ = 90°, the torque and the potential energy of the dipole will respectively be

AIPMT 2012 · PRELIMS

(a) pEsinθ, –pEcosθ (b) pEsinθ, –2pEcosθ
(c) pEsinθ, 2pEcosθ (d) pEcosθ, –pEsinθ

247. An electric dipole of moment $\vec{p}$ is lying along a uniform electric field $\vec{E}$. The work done in rotating the dipole by 90° is

AIPMT 2006

(a) pE (b) $\sqrt{2}pE$ (c) pE/2 (d) 2pE

248. An electric dipole has the magnitude of its charge as q and its dipole moment is p. It is placed in a uniform electric field E. If its dipole moment is along the direction of the field, the force on it and its potential energy are respectively

AIPMT 2004

(a) 2q.E and minimum (b) q.E and p.E
(c) zero and minimum (d) q.E and maximum

249. 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

(a) $\vec{\tau} = \vec{p}.\vec{E}$ (b) $\vec{\tau} = \vec{p} \times \vec{E}$
(c) $\vec{\tau} = \vec{p} + \vec{E}$ (d) $\vec{\tau} = \vec{p} - \vec{E}$

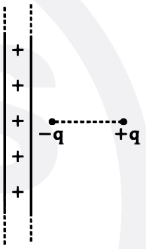
250. A dipole with two electric charges of 2 μC magnitude each, with separation distance 0.5 μm, is placed between the plates of a capacitor such that its axis is parallel to an electric field established between the plates when a potential difference of 5 V is applied. Separation between the plates is 0.5 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 · 7 APR · SHIFT 2

(a) 2.5×10^{-9} Nm (b) 2.5×10^{-12} Nm
(c) 5×10^{-3} Nm (d) 5×10^{-9} Nm

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

JEE MAIN 2025 · 29 JAN · SHIFT 2



(a) Torque on dipole is zero and net force is directed away from the sheet.
(b) Potential energy of dipole is minimum and torque is zero.
(c) Potential energy and torque both are maximum.
(d) Torque on dipole is zero and net force acts towards the sheet.

252. Two point charges $-4\mu c$ and $4\mu c$, constituting an electric dipole, are placed at $(-9,0,0)\text{cm}$ and $(9,0,0)\text{cm}$ in a uniform electric field of strength 10^4NC^{-1}. The work done on the dipole in rotating it from the equilibrium through 180° is:

JEE MAIN 2025 · 23 JAN · SHIFT 2

(a) 18.4 mJ (b) 12.4 mJ (c) 16.4 mJ (d) 14.4 mJ

253. Two charges each of magnitude 0.01 C and separated by a distance of $0.4\,\text{mm}$ constitute an electric dipole. If the dipole is placed in an uniform electric field '$\vec{E}$' of 10 dyne/C making 30° angle with $\vec{E}$, the magnitude of torque acting on dipole is:

JEE MAIN 2023 · 13 APR · SHIFT 1

(a) 4.0×10^{-10} Nm (b) 1.5×10^{-9} Nm
(c) 1.0×10^{-8} Nm (d) 2.0×10^{-10} Nm

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254. An electric field of 1000 V/m is applied to an electric dipole at angle of 45°. The value of electric dipole moment is 10^{-29} C.m. What is the potential energy of the electric dipole?

JEE MAIN 2019 · 11 JAN · SHIFT 2

(a) -7×10^{-27} J (b) -9×10^{-20} J
(c) -10×10^{-29} J (d) -20×10^{-18} J

255. An electric dipole of dipole moment 6×10^{-6}Cm is placed in uniform electric field of magnitude 10^{6}V/m. Initially, the dipole moment is parallel to electric field. The work that needs to be done on the dipole to make its dipole moment opposite to the field, will be _____ J.

JEE MAIN 2025 · 28 JAN · SHIFT 2 *(Numerical)*

256. An electric dipole of dipole moment 6.0×10^{-6} Cm is placed in a uniform electric field of 1.5×10^{3} NC^{-1} in such a way that dipole moment is along electric field. The work done in rotating dipole by 180° in this field will be _____ mJ.

JEE MAIN 2023 · 8 APR · SHIFT 1 *(Numerical)*

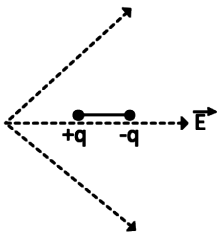
257. Two electric dipoles of dipole moments 1.2×10^{-30} Cm and 2.4×10^{-30} Cm are placed in two different uniform electric fields of strengths 5×10^{4} NC^{-1} and 15×10^{4} NC^{-1} respectively. The ratio of maximum torque experienced by the electric dipoles will be $\frac{1}{x}$. The value of x is _____.

JEE MAIN 2022 · 28 JUL · SHIFT 1 *(Numerical)*

◆ Dipole in non-uniform field & dipole-dipole 2 Qs

258. A dipole is placed in an electric field as shown. In which direction will it move?

NEET 2021



(a) towards the right as its potential energy will increase.
(b) towards the left as its potential energy will increase.
(c) towards the right as its potential energy will decrease.
(d) towards the left as its potential energy will decrease.

259. An electric dipole is placed at an angle of 30° to a non-uniform electric field. The dipole will experience

AIEEE 2006

(a) a translation force only in the direction of the field
(b) a translation force only in a direction normal to the direction of the field
(c) a torque as well as a translational force
(d) a torque only

◆ Polar molecules & dielectrics 12 Qs

260. Polar molecules are those in which

MHT CET 2026 · 20 MAY · SHIFT 1

(a) they have symmetric shape.
(b) centre of mass of positive charges does not coincide with centre of mass of negative charges.
(c) they have no permanent dipole moments.
(d) centre of mass of positive charges coincide with centre of mass of negative charges.

261. When a dielectric is placed in an electric field, the electric field inside the dielectric

MHT CET 2026 · 14 MAY · SHIFT 1

(a) increases (b) decreases
(c) is constant (d) is zero

262. When the dielectric is placed in an external electric field, the electric field inside the dielectric is

MHT CET 2026 · 12 MAY · SHIFT 1

(a) larger than the external electric field.
(b) less than the external electric field.
(c) equal to the external electric field.
(d) equal to or greater than external electric field.

263. Select the 'WRONG' statement about polar molecules.

MHT CET 2026 · 20 APR · SHIFT 2

(a) A molecule in which centre of mass of positive charges does not coincide with the centre of mass of negative charges is a polar molecule.
(b) They have permanent dipole moment.
(c) They act as tiny electric dipoles.
(d) They have symmetrical shape.

264. Select the WRONG statement about polar molecules.

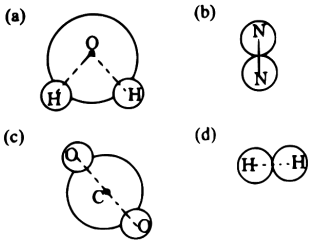
MHT CET 2026 · 17 APR · SHIFT 1

(a) Polar molecules have permanent dipole moment.
(b) A molecule in which centre of mass of positive charges does not coincide with the centre of mass of negative charges is a polar molecule.
(c) Polar molecules have symmetrical shape.
(d) Polar molecules act as tiny electric dipoles.

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265. Out of the following molecules the one which represents the polar molecule is

MHT CET 2025 · 23 APR · SHIFT 2



(a) (d) (b) (a) (c) (c) (d) (b)

266. When the dielectric is placed in an external electric field, the electric field inside the dielectric is

MHT CET 2024 · 16 MAY · SHIFT 1

(a) less than the external electric field.
(b) larger than the external electric field.
(c) equal to the external electric field.
(d) equal to or greater than external electric field.

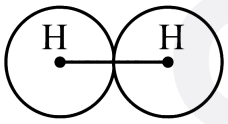
267. Which of the following is the dimensional formula for electric polarisation?

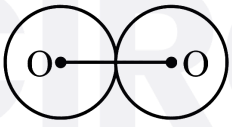
MHT CET 2019 · 3 MAY · SHIFT 1

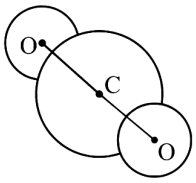
(a) $[M^0L^{-2}T^1I^1]$ (b) $[M^{-1}L^{-2}T^1I^{-1}]$
(c) $[M^0L^{-1}T^{-1}I^1]$ (d) $[M^1L^{-2}T^1I^1]$

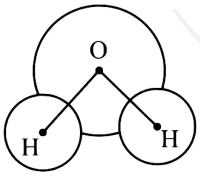
268. Which of the following molecules is a polar molecule?

MHT CET 2019 · 2 MAY · SHIFT 2

(a) 

(b) 

(c) 

(d) 

269. Polar molecules are the molecules:

NEET 2021

(a) having a permanent electric dipole moment
(b) having zero dipole moment
(c) acquire a dipole moment only in the presence of electric field due to displacement of charges
(d) acquire a dipole moment only when magnetic field is absent

270. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Net dipole moment of a polar linear isotropic dielectric substance is not zero even in the absence of an external electric field.

Reason (R): In absence of an external electric field, the different permanent dipoles of a polar dielectric substance are oriented in random directions.

In the light of the above statements, choose the most appropriate answer from the options given below:

JEE MAIN 2025 · 2 APR · SHIFT 2

(a) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(b) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(c) (A) is not correct but (R) is correct
(d) (A) is correct but (R) is not correct

271. Given below two statements: One is labelled as Assertion (A) and other is labelled as Reason (R). Assertion (A): Non-polar materials do not have any permanent dipole moment. Reason (R): When a non-polar material is placed in an electric field, the centre of the positive charge distribution of it's individual atom or molecule coincides with the centre of the negative charge distribution.

In the light of above statements, choose the most appropriate answer from the options given below.

JEE MAIN 2022 · 26 JUN · SHIFT 1

(a) Both (A) and (R) are correct and (R) is the correct explanation of (A).
(b) Both (A) and (R) are correct and (R) is not the correct explanation of (A).
(c) (A) is correct but (R) is not correct.
(d) (A) is not correct but (R) is correct.

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ANSWER KEY

Shaded by level: **Easy**

01 Electric Charge & Coulomb's Law

1. (c)	2. (d)	3. (d)	4. (b)	5. (d)	6. (c)	7. (b)	8. (c)	9. (c)	10. (a)
11. (a)	12. (c)	13. (a)	14. (c)	15. (d)	16. (b)	17. (d)	18. (a)	19. (b)	20. (a)
21. (b)	22. (a)	23. (b)	24. (a)	25. (b)	26. (c)	27. (d)	28. (d)	29. (a)	30. (b)
31. (a)	32. (d)	33. (b)	34. (a)	35. (c)	36. (b)	37. (d)			

02 Electric Field & Field Lines

38. (d)	39. (d)	40. (b)	41. (b)	42. (c)	43. (c)	44. (c)	45. (c)	46. (c)	

03 Electric Flux & Gauss's Law

47. (d)	48. (b)	49. (d)	50. (d)	51. (a)	52. (c)	53. 15	54. 12	55. 640	56. 1
57. (d)	58. (b)	59. (b)	60. (c)	61. (c)	62. (b)	63. (a)	64. (c)	65. (d)	66. (a)
67. (c)	68. (d)	69. (c)	70. (d)	71. (d)	72. (b)	73. (b)	74. (b)	75. (d)	76. (d)
77. (c)	78. (b)	79. (c)	80. (d)	81. (b)	82. (a)	83. (b)	84. (d)	85. (c)	86. (b)
87. (d)	88. (a)	89. (c)	90. (d)	91. (d)	92. (c)	93. (d)	94. (c)	95. (a)	96. (b)
97. (a)	98. (c)	99. (d)	100. (a)	101. (a)	102. (b)	103. (b)	104. (d)	105. (c)	106. (c)
107. (b)	108. (c)	109. (a)	110. 1	111. (c)	112. (c)	113. (b)	114. (c)	115. (b)	116. (c)
117. (a)	118. (a)	119. (a)	120. (a)	121. (b)	122. (d)	123. (c)	124. (b)	125. (d)	126. (c)
127. (a)									

04 Motion of Charges in an Electric Field

128. (b)	129. (b)	130. (b)	131. (a)	132. (b)	133. (c)	134. (a)	135. (b)	136. (c)	137. (b)
138. (b)	139. (c)	140. (a)	141. (c)	142. (c)					

05 Electric Potential & Equipotentials

143. (a)	144. (b)	145. (c)	146. (b)	147. (d)	148. (b)	149. (c)	150. (b)	151. (c)	152. (a)
153. (c)	154. (c)	155. (a)	156. (a)	157. (a)	158. (d)	159. (c)	160. (c)	161. (b)	162. (c)
163. (a)	164. (b)	165. (b)	166. (a)	167. (d)	168. (c)	169. 8	170. (d)	171. (b)	172. (d)
173. (d)	174. (b)	175. (b)	176. (c)	177. (a)	178. (a)	179. (c)	180. 160	181. 198	182. 128
183. (b)	184. (a)	185. (c)	186. (d)	187. (d)	188. (d)	189. (a)	190. (d)	191. (a)	192. (d)
193. (d)	194. (b)	195. (d)	196. (c)	197. (a)	198. (a)	199. (a)			

06 Electrostatic Potential Energy

200. (c)	201. (a)	202. (b)	203. (d)	204. (a)	205. (d)	206. (d)	207. (d)	208. (a)	209. (b)
210. (d)	211. (b)	212. (a)	213. (b)	214. (c)	215. (b)	216. (c)	217. (c)	218. (a)	219. (d)
220. (c)									

07 Electric Dipole

221. (b)	222. (d)	223. (c)	224. (b)	225. (a)	226. (a)	227. (d)	228. (a)	229. (c)	230. (d)
231. (d)	232. (d)	233. (b)	234. (b)	235. (c)	236. (c)	237. (b)	238. (a)	239. (d)	240. (c)
241. (d)	242. (d)	243. (c)	244. (b)	245. (b)	246. (a)	247. (a)	248. (c)	249. (b)	250. (d)
251. (b)	252. (d)	253. (d)	254. (a)	255. 12	256. 18	257. 6	258. (c)	259. (c)	260. (b)
261. (b)	262. (b)	263. (d)	264. (c)	265. (b)	266. (a)	267. (a)	268. (d)	269. (a)	270. (c)
271. (c)									

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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