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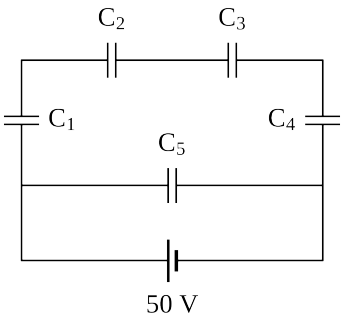
NEET ELECTROSTATIC POTENTIAL AND CAPACITANCE — PYQS

Max. Marks: 296 **Questions:** 74

Section A (MCQ) — 74 questions

Q.1 Five capacitors of capacitances $C_1 = C_2 = C_3 = C_4 = 10\ \mu F$ and $C_5 = 2.5\ \mu F$ are connected as shown, along with a battery of 50 V.



The equivalent capacitance and the charges on each capacitor respectively are : [NEET (UG) 2026]

(1) 4 μF, 250 μC on C_1 to C_4 and 125 μC on C_5

(2) 5 μF, 250 μC on all capacitors

(3) 5 μF, 125 μC on C_1 to C_4 and 25 μC on C_5

(4) 5 μF, 125 μC on all capacitors

Scan or tap for the full solution

Q.2 Consider two uncharged capacitors of equal capacitance 200 pF. One of them is charged by a 100 V supply and disconnected. Now this capacitor is connected to the uncharged capacitor. The amount of electrostatic energy lost in the process is : [NEET (UG) 2026]

(1) 0.5 J (2) 1.0×10^{-6} J

(3) 0.5×10^{-6} J (4) 1.0 J

Scan or tap for the full solution

Q.3 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.

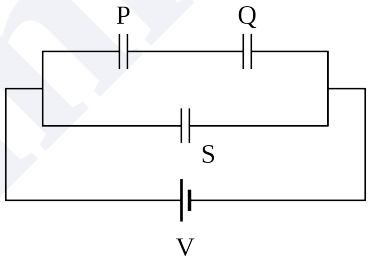
Choose the correct answer from the options given below : [NEET (UG) 2026]

(1) A, C and D only (2) A, C and E only

(3) C, D and E only (4) A, B and D only

Scan or tap for the full solution

Q.4 Three identical capacitors, P, Q and S, each of the capacitance C, are connected to a battery of voltage V, as shown in the figure. If the energy stored in the capacitor P and total energy stored in the system are U_P and U_T, respectively, then the ratio $\frac{U_P}{U_T}$ is: [RE-NEET (UG) 2026]



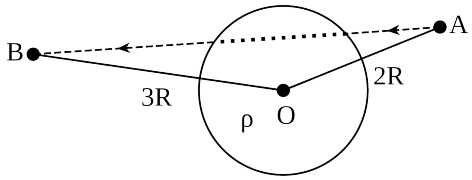
(1) 1/6 (2) 2/3 (3) 1/3 (4) 1/2

Scan or tap for the full solution

Q.5 A unit positive point charge is taken slowly through an infinitesimally thin tube that is inside a charged dielectric sphere of radius R, having uniform positive charge density ρ, as shown in the figure. The initial and final positions of the charge are marked by A and B at distance 2R and 3R respectively, from the centre of the sphere. In this process, the magnitude of the total work done on the point charge is $\frac{\rho R^2}{n\varepsilon_0}$. The value of n is :

(ε_0 is the permittivity of vacuum)

[RE-NEET (UG) 2026]



(1) 18 (2) 2 (3) 6 (4) 9

Scan or tap for the full solution

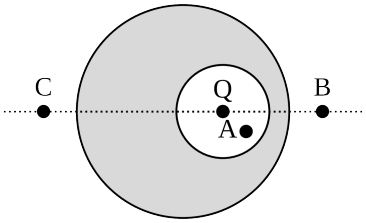
Q.6 Consider a fixed uniformly charged insulating sphere with radius R and total charge +Q. A point charge −q ($q \ll Q$) with mass m is released from rest at a distance of 3R from the centre of the charged sphere. When the point charge reaches the surface of the sphere, its speed is:
(ε_0 is the permittivity of vacuum, neglect gravitational forces). [RE-NEET (UG) 2026]

(1) $\sqrt{\frac{Qq}{4\pi\varepsilon_0 mR}}$ (2) $\sqrt{\frac{3Qq}{4\pi\varepsilon_0 mR}}$

(3) $\sqrt{\frac{2Qq}{3\pi\varepsilon_0 mR}}$ (4) $\sqrt{\frac{Qq}{3\pi\varepsilon_0 mR}}$

Scan or tap for the full solution

Q.7 A point charge Q is placed inside a cavity within a solid isolated conducting sphere. Consider points A, B and C as shown in the figure, where the magnitudes of the electric fields are E_A, E_B, E_C, respectively. The points B and C are at the same distance from the center of the solid sphere. The correct option is : [RE-NEET (UG) 2026]



(1) $E_A \neq 0$, $E_B < E_C$ (2) $E_A = 0$, $E_B = E_C$

(3) $E_A \neq 0$, $E_B = E_C$ (4) $E_A = 0$, $E_B > E_C$

Scan or tap for the full solution

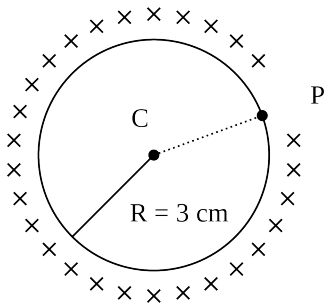
Q.8 The plates of a parallel plate capacitor are separated by d. Two slabs of different dielectric constant K_1 and K_2 with thickness $\frac{3}{8}d$ and $\frac{d}{2}$, respectively are inserted in the capacitor. Due to this, the capacitance becomes two times larger than when there is nothing between the plates. If $K_1 = 1.25K_2$, the value of K_1 is: [NEET (UG) 2025]

(1) 1.60 (2) 1.33 (3) 2.66 (4) 2.33

Scan or tap for the full solution

Q.9 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 (UG) 2024]



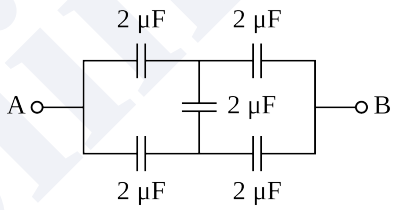
q = 1 μC

(1) 3×10^5 (2) 1×10^5

(3) 0.5×10^5 (4) Zero

Solution

Q.10 In the following circuit, the equivalent capacitance between terminal A and terminal B is : [NEET (UG) 2024]



(1) 2 μF (2) 1 μF (3) 0.5 μF (4) 4 μF

Scan or tap for the full solution

Q.11 **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} C m, is $\pm 9 \times 10^3$ V.

(Take $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ SI units)

Reason (R): $V = \pm\frac{2P}{4\pi\varepsilon_0 r^2}$, 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 (UG) 2024]

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

(2) Both A and R are true and R is NOT the correct explanation of A.

(3) A is true but R is false.

(4) A is false but R is true.

Scan or tap for the full solution

Q.12 If the plates of a parallel plate capacitor connected to a battery are moved close to each other, then

A. the charge stored in it, increases.
B. the energy stored in it, decreases.
C. its capacitance increases.
D. the ratio of charge to its potential remains the same.
E. the product of charge and voltage increases.

Choose the most appropriate answer from the options given below: [NEET (UG) 2024]

(1) A, B and E only (2) A, C and E only
(3) B, D and E only (4) A, B and C only

Scan or tap for the full solution

Q.13 A 12 pF capacitor is connected to a 50 V battery, the electrostatic energy stored in the capacitor in nJ is [RE-NEET (UG) 2024]

(1) 15 (2) 7.5 (3) 0.3 (4) 150

Scan or tap for the full solution

Q.14 The capacitance of a capacitor with charge q and a potential difference V depends on [RE-NEET (UG) 2024]

(1) both q and V
(2) the geometry of the capacitor
(3) q only
(4) V only

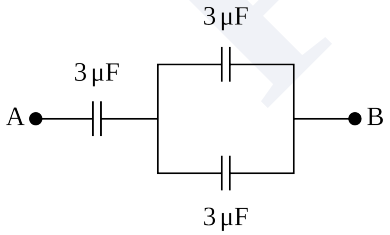
Solution

Q.15 The value of electric potential at a distance of 9 cm from the point charge 4×10^{-7} C is [Given $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9\ \text{N m}^2\text{C}^{-2}$]: [RE-NEET (UG) 2024]

(1) 4×10^2 V (2) 44.4 V
(3) 4.4×10^5 V (4) 4×10^4 V

Scan or tap for the full solution

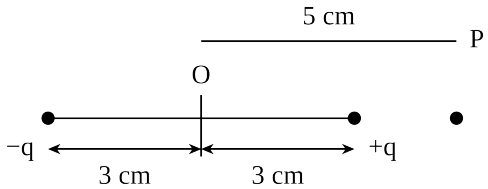
Q.16 The equivalent capacitance of the system shown in the following circuit is: [NEET (UG) 2023]



(1) 3 μF (2) 6 μF (3) 9 μF (4) 2 μF

Scan or tap for the full solution

Q.17 An electric dipole is placed as shown in the figure.



The electric potential (in 10^2 V) at point P due to the dipole is (ε_0 = permittivity of free space and $\frac{1}{4\pi\varepsilon_0} = K$) : [NEET (UG) 2023]

(1) $\left(\frac{5}{8}\right)qK$ (2) $\left(\frac{8}{5}\right)qK$
(3) $\left(\frac{8}{3}\right)qK$ (4) $\left(\frac{3}{8}\right)qK$

Scan or tap for the full solution

Q.18 The angle between the electric lines of force and the equipotential surface is [NEET (UG) 2022]

(1) 0° (2) 45° (3) 90° (4) 180°

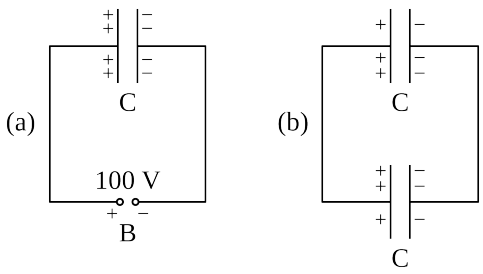
Scan or tap for the full solution

Q.19 Two hollow conducting spheres of radii R_1 and R_2 ($R_1 >> R_2$) have equal charges. The potential would be [NEET (UG) 2022]

(1) More on bigger sphere
(2) More on smaller sphere
(3) Equal on both the spheres
(4) Dependent on the material property of the sphere

Scan or tap for the full solution

Q.20 A capacitor of capacitance C = 900 pF is charged fully by 100 V battery B as shown in figure (a). Then it is disconnected from the battery and connected to another uncharged capacitor of capacitance C = 900 pF as shown in figure (b). The electrostatic energy stored by the system (b) is [NEET (UG) 2022]



(1) 4.5×10^{-6} J (2) 3.25×10^{-6} J
(3) 2.25×10^{-6} J (4) 1.5×10^{-6} J

Scan or tap for the full solution

Q.21 The distance between the two plates of a parallel plate capacitor is doubled and the area of each plate is halved. If C is its initial capacitance, its final capacitance is equal to [NEET (UG) 2022 (Phase 2)]

(1) $\frac{C}{4}$ (2) 2C (3) $\frac{C}{2}$ (4) 4C

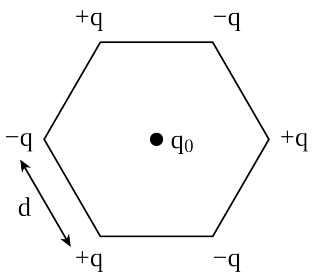
Scan or tap for the full solution

Q.22 The effective capacitances of two capacitors are 3 μF and 16 μF, when they are connected in series and parallel respectively. The capacitance of two capacitors are : [NEET (UG) 2022 (Phase 2)]

(1) 1.2 μF, 1.8 μF (2) 10 μF, 6 μF
(3) 8 μF, 8 μF (4) 12 μF, 4 μF

Scan or tap for the full solution

Q.23 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 (UG) 2022 (Phase 2)]



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

Scan or tap for the full solution

Q.24 A parallel plate capacitor has a uniform electric field $\vec{E}$ in the space between the plates. If the distance between the plates is 'd' and the area of each plate is 'A', the energy stored in the capacitor is : (ε_0 = permittivity of free space)
[NEET (UG) 2021]

(1) $\frac{E^2Ad}{\varepsilon_0}$ (2) $\frac{1}{2}\varepsilon_0 E^2$
(3) $\varepsilon_0 EAd$ (4) $\frac{1}{2}\varepsilon_0 E^2 Ad$

Scan or tap for the full solution

Q.25 Polar molecules are the molecules : [NEET (UG) 2021]

(1) having a permanent electric dipole moment
(2) having zero dipole moment
(3) acquire a dipole moment only in the presence of electric field due to displacement of charges
(4) acquire a dipole moment only when magnetic field is absent

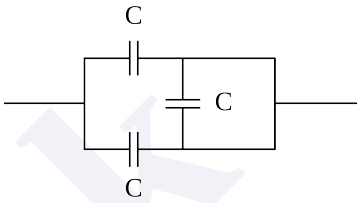
Scan or tap for the full solution

Q.26 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 (UG) 2021]

(1) $\frac{R_1^2}{R_2^2}$ (2) $\frac{R_1}{R_2}$
(3) $\frac{R_2}{R_1}$ (4) $\sqrt{\left(\frac{R_1}{R_2}\right)}$

Scan or tap for the full solution

Q.27 The equivalent capacitance of the combination shown in the figure is : [NEET (UG) 2021]



(1) 3C/2 (2) 3C (3) 2C (4) C/2

Scan or tap for the full solution

Q.28 Twenty seven drops of same size are charged at 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop. [NEET (UG) 2021]

(1) 1980 V (2) 660 V (3) 1320 V (4) 1520 V

Scan or tap for the full solution

Q.29 A short electric dipole has a dipole moment of 16×10^{-9} C m. 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 :
$\left(\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9\ \text{N m}^2/\text{C}^2\right)$ [NEET (UG) 2020]

(1) 200 V (2) 400 V (3) zero (4) 50 V

Scan or tap for the full solution

Q.30 The capacitance of a parallel plate capacitor with air as medium is 6 μF. With the introduction of a dielectric medium, the capacitance becomes 30 μF. The permittivity of the medium is :
($\varepsilon_0 = 8.85 \times 10^{-12}\ C^2\ N^{-1}\ m^{-2}$) [NEET (UG) 2020]

(1) $1.77 \times 10^{-12}\ C^2\ N^{-1}\ m^{-2}$
(2) $0.44 \times 10^{-10}\ C^2\ N^{-1}\ m^{-2}$
(3) $5.00\ C^2\ N^{-1}\ m^{-2}$
(4) $0.44 \times 10^{-13}\ C^2\ N^{-1}\ m^{-2}$

Solution

Q.31 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 (UG) 2020]

(1) 0.5 N/C (2) 1 N/C
(3) 5 N/C (4) zero

Solution

Q.32 The electrostatic force between the metal plates of an isolated parallel plate capacitor C having a charge Q and area A, is [NEET 2018]

(1) Independent of the distance between the plates
(2) Linearly proportional to the distance between the plates
(3) Proportional to the square root of the distance between the plates
(4) Inversely proportional to the distance between the plates

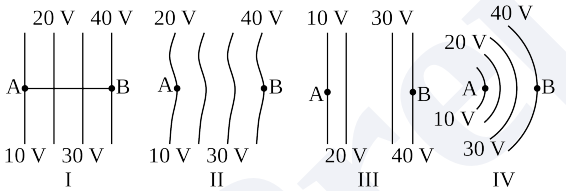
Scan or tap for the full solution

Q.33 A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of resulting system [NEET 2017]

(1) decreases by a factor of 2
(2) remains the same
(3) increases by a factor of 2
(4) increases by a factor of 4

Solution

Q.34 The diagrams below show regions of equipotentials.

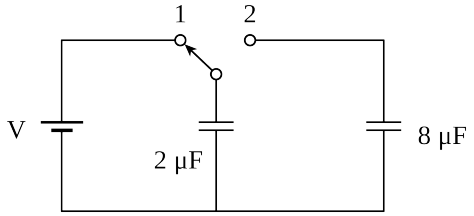


A positive charge is moved from A to B in each diagram. [NEET 2017]

(1) In all the four cases the work done is the same.
(2) Minimum work is required to move q in figure (I).
(3) Maximum work is required to move q in figure (II).
(4) Maximum work is required to move q in figure (III)

Scan or tap for the full solution

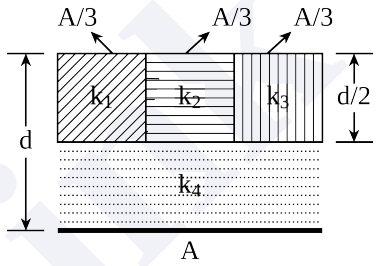
Q.35 A capacitor of 2 μF is charged as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is [NEET 2016 (Phase 1)]



(1) 75% (2) 80% (3) 0% (4) 20%

Scan or tap for the full solution

Q.36 A parallel-plate capacitor of area A, plate separation d and capacitance C is filled with four dielectric materials having dielectric constants k_1, k_2, k_3 and k_4 as shown in the figure. If a single dielectric material is to be used to have the same capacitance C in this capacitor, then its dielectric constant k is given by [NEET 2016 (Phase 2)]



(1) $k = k_1 + k_2 + k_3 + 3k_4$

(2) $k = \frac{2}{3}(k_1 + k_2 + k_3) + 2k_4$

(3) $\frac{2}{k} = \frac{3}{k_1 + k_2 + k_3} + \frac{1}{k_4}$

(4) $\frac{1}{k} = \frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3} + \frac{3}{2k_4}$

Scan or tap for the full solution

Q.37 A parallel plate air capacitor has capacity C, distance of separation between plates is d and potential difference V is applied between the plates. Force of attraction between the plates of the parallel plate air capacitor is [AIPMT 2015]

(1) $\frac{CV^2}{d}$ (2) $\frac{C^2V^2}{2d^2}$ (3) $\frac{C^2V^2}{2d}$ (4) $\frac{CV^2}{2d}$

Scan or tap for the full solution

Q.38 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]

(1) $-(2\hat{i} + 3\hat{j} + \hat{k})$ (2) $-(6\hat{i} + 9\hat{j} + \hat{k})$
(3) $-(3\hat{i} + 5\hat{j} + 3\hat{k})$ (4) $-(6\hat{i} + 5\hat{j} + 2\hat{k})$

Scan or tap for the full solution

Q.39 A parallel plate air capacitor of capacitance C is connected to a cell of emf V and then disconnected from it. A dielectric slab of dielectric constant K, which can just fill the air gap of the capacitor, is now inserted in it. Which of the following is incorrect? [AIPMT 2015 (Cancelled)]

(1) The change in energy stored is $\frac{1}{2}CV^2\left(\frac{1}{K}-1\right)$

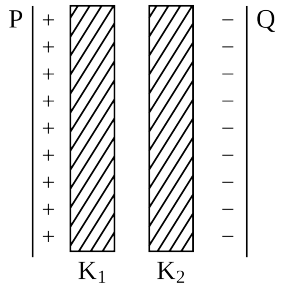
(2) The charge on the capacitor is not conserved.

(3) The potential difference between the plates decreases K times.

(4) The energy stored in the capacitor decreases K times.

Scan or tap for the full solution

Q.40 Two thin dielectric slabs of dielectric constants K_1 and K_2 ($K_1 < K_2$) are inserted between plates of a parallel plate capacitor, as shown in the figure. The variation of electric field E between the plates with distance d as measured from plate P is correctly shown by [AIPMT 2014]



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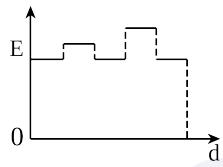

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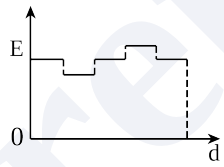

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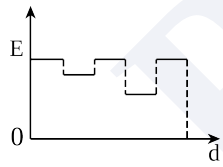

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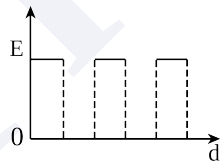


Scan or tap for the full solution

Q.41 A conducting sphere of radius R is given a charge Q. The electric potential and the electric field at the centre of the sphere respectively are [AIPMT 2014]

(1) zero and $\frac{Q}{4\pi\varepsilon_0 R^2}$

(2) $\frac{Q}{4\pi\varepsilon_0 R}$ and zero

(3) $\frac{Q}{4\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi\varepsilon_0 R^2}$

(4) both are zero

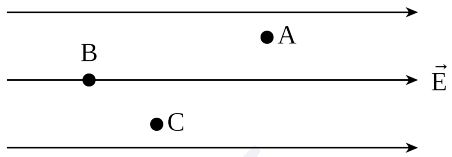
Solution

Q.42 In a region, the potential is represented by V(x, y, z) = 6x − 8xy − 8y + 6yz, where V is in volts and x, y, z are in metres. The electric force experienced by a charge of 2 coulomb situated at point (1, 1, 1) is [AIPMT 2014]

(1) $6\sqrt{5}$ N (2) 30 N (3) 24 N (4) $4\sqrt{35}$ N

Scan or tap for the full solution

Q.43 A, B and C are three points in a uniform electric field. The electric potential is [NEET 2013]



(1) maximum at C

(2) same at all the three points A, B and C

(3) maximum at A

(4) maximum at B

Scan or tap for the full solution

Q.44 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 (Karnataka)]

(1) p^2E (2) pE (3) infinity (4) pE^2

Scan or tap for the full solution

Q.45 A parallel plate capacitor has a uniform electric field E in the space between the plates. If the distance between the plates is d and area of each plate is A, the energy stored in the capacitor is [AIPMT 2012 (Mains)]

(1) $\frac{1}{2}\varepsilon_0 E^2$ (2) $\frac{E^2 Ad}{\varepsilon_0}$

(3) $\frac{1}{2}\varepsilon_0 E^2 Ad$ (4) $\varepsilon_0 EAd$

Scan or tap for the full solution

Q.46 Two metallic spheres of radii 1 cm and 3 cm are given charges of -1×10^{-2} C and 5×10^{-2} C, respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is [AIPMT 2012 (Mains)]

(1) 2×10^{-2} C (2) 3×10^{-2} C

(3) 4×10^{-2} C (4) 1×10^{-2} C

Scan or tap for the full solution

Q.47 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 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)]

(1) $pE\sin\theta,\ -pE\cos\theta$ (2) $pE\sin\theta,\ -2pE\cos\theta$

(3) $pE\sin\theta,\ 2pE\cos\theta$ (4) $pE\cos\theta,\ -pE\sin\theta$

Scan or tap for the full solution

Q.48 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)]

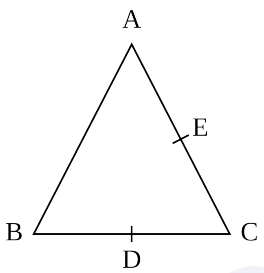
(1) $Q = -q$ (2) $Q = -\frac{1}{q}$

(3) $Q = q$ (4) $Q = \frac{1}{q}$

Scan or tap for the full solution

Q.49 Three charges, each +q, are placed at the corners of an isosceles triangle ABC of sides BC and AC, 2a. D and E are the mid points of BC and CA. The work done in taking a charge Q from D to E is

[AIPMT 2011 (Mains)]



(1) $\frac{3qQ}{4\pi\varepsilon_0 a}$ (2) $\frac{3qQ}{8\pi\varepsilon_0 a}$ (3) $\frac{qQ}{4\pi\varepsilon_0 a}$ (4) zero

Scan or tap for the full solution

Q.50 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/metre, is

[AIPMT 2011 (Mains)]

(1) 8 along negative X-axis

(2) 8 along positive X-axis

(3) 16 along negative X-axis

(4) 16 along positive X-axis

Solution

Q.51 A parallel plate capacitor has a uniform electric field E in the space between the plates. If the distance between the plates is d and area of each plate is A, the energy stored in the capacitor is

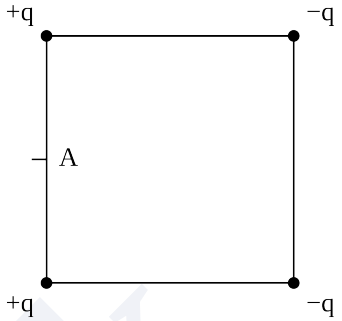
[AIPMT 2011 (Prelims)]

(1) $\frac{1}{2}\varepsilon_0 E^2$ (2) $\frac{E^2 Ad}{\varepsilon_0}$

(3) $\frac{1}{2}\varepsilon_0 E^2 Ad$ (4) $\varepsilon_0 EAd$

Scan or tap for the full solution

Q.52 Four electric charges +q, +q, −q and −q are placed at the corners of a square of side 2L (see figure). The electric potential at point A, midway between the two charges +q and +q, is [AIPMT 2011 (Prelims)]



(1) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1+\sqrt{5}\right)$

(2) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1+\frac{1}{\sqrt{5}}\right)$

(3) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1-\frac{1}{\sqrt{5}}\right)$

(4) zero

Scan or tap for the full solution

Q.53 Two parallel metal plates having charges +Q and −Q face each other at a certain distance between them. If the plates are now dipped in kerosene oil tank, the electric field between the plates will

[AIPMT 2010 (Mains)]

(1) become zero (2) increase

(3) decrease (4) remain same

Scan or tap for the full solution

Q.54 A series combination of n_1 capacitors, each of value C_1, is charged by a source of potential difference 4V. When another parallel combination of n_2 capacitors, each of value C_2, is charged by a source of potential difference V, it has the same (total) energy stored in it as the first combination has. The value of C_2, in terms of C_1, is then

[AIPMT 2010 (Prelims)]

(1) $\frac{2C_1}{n_1 n_2}$ (2) $16\frac{n_2}{n_1}C_1$

(3) $2\frac{n_2}{n_1}C_1$ (4) $\frac{16C_1}{n_1 n_2}$

Scan or tap for the full solution

Q.55 Three concentric spherical shells have radii a, b and c (a < b < c) and have surface charge densities σ, −σ and σ respectively. If V_A, V_B and V_C denote the potentials of the three shells, then, for c = a + b, we have [AIPMT 2009]

(1) $V_C = V_B \neq V_A$ (2) $V_C \neq V_B \neq V_A$

(3) $V_C = V_B = V_A$ (4) $V_C = V_A \neq V_B$

Scan or tap for the full solution

Q.56 Three capacitors each of capacitance C and of breakdown voltage V are joined in series. The capacitance and breakdown voltages of the combination will be [AIPMT 2009]

(1) $3C, \frac{V}{3}$ (2) $\frac{C}{3}, 3V$

(3) 3C, 3V (4) $\frac{C}{3}, \frac{V}{3}$

Scan or tap for the full solution

Q.57 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]

(1) $\vec{E} = \hat{i}2xy + \hat{j}(x^2 + y^2) + \hat{k}(3xz - y^2)$

(2) $\vec{E} = \hat{i}z^3 + \hat{j}xyz + \hat{k}z^2$

(3) $\vec{E} = \hat{i}(2xy - z^3) + \hat{j}xy^2 + \hat{k}3z^2x$

(4) $\vec{E} = \hat{i}(2xy + z^3) + \hat{j}x^2 + \hat{k}3xz^2$

Scan or tap for the full solution

Q.58 A parallel plate capacitor has a uniform electric field E in the space between the plates. If the distance between the plates is d and area of each plate is A, the energy stored in the capacitor is [AIPMT 2008]

(1) $\frac{1}{2}\varepsilon_0 E^2$ (2) $\frac{E^2 Ad}{\varepsilon_0}$

(3) $\frac{1}{2}\varepsilon_0 E^2 Ad$ (4) $\varepsilon_0 EAd$

Scan or tap for the full solution

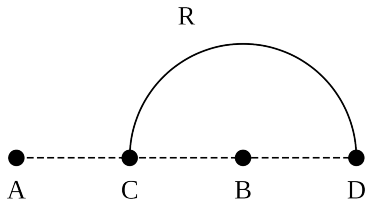
Q.59 The electric potential at a point in free space due to charge Q coulomb is Q × 10^{11} volts. The electric field at that point is [AIPMT 2008]

(1) $4\pi\varepsilon_0 Q \times 10^{20}$ volt/m (2) $12\pi\varepsilon_0 Q \times 10^{22}$ volt/m

(3) $4\pi\varepsilon_0 Q \times 10^{22}$ volt/m (4) $12\pi\varepsilon_0 Q \times 10^{20}$ volt/m

Scan or tap for the full solution

Q.60 Charges +q and −q are placed at points A and B respectively which are a distance 2L apart, C is the midpoint between A and B. The work done in moving a charge +Q along the semicircle CRD is [AIPMT 2007]

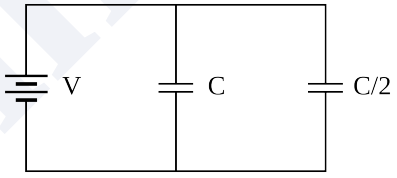


(1) $\frac{qQ}{2\pi\varepsilon_0 L}$ (2) $\frac{qQ}{6\pi\varepsilon_0 L}$

(3) $-\frac{qQ}{6\pi\varepsilon_0 L}$ (4) $\frac{qQ}{4\pi\varepsilon_0 L}$

Scan or tap for the full solution

Q.61 Two condensers, one of capacity C and other of capacity C/2 are connected to a V-volt battery, as shown in the figure. The work done in charging fully both the condensers is [AIPMT 2007]



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

Scan or tap for the full solution

Q.62 A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting the charging battery the distance between the plates of the capacitor is increased using an insulating handle. As a result the potential difference between the plates [AIPMT 2006]

(1) increases (2) decreases

(3) does not change (4) becomes zero

Scan or tap for the full solution

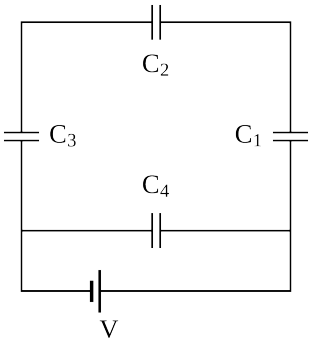
Q.63 An electric dipole of moment $\vec{p}$ is lying along a uniform electric field $\vec{E}$. The work done in rotating the dipole by 90° is [AIPMT 2006]

(1) pE (2) $\sqrt{2}$pE

(3) pE/2 (4) 2pE

Scan or tap for the full solution

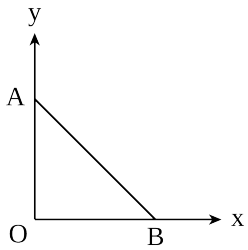
Q.64 A network of four capacitors of capacity equal to C_1 = C, C_2 = 2C, C_3 = 3C and C_4 = 4C are connected to a battery as shown in the figure. The ratio of the charges on C_2 and C_4 is [AIPMT 2005]



(1) 4/7 (2) 3/22 (3) 7/4 (4) 22/3

Scan or tap for the full solution

Q.65 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 [coordinates (a, 0)] along the straight path AB is [AIPMT 2005]

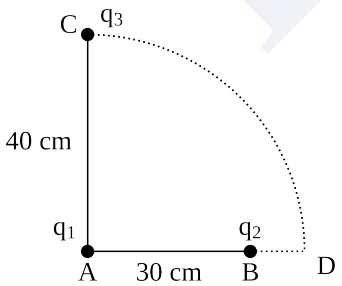


(1) zero (2) $\left(\frac{qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\cdot\sqrt{2}a$

(3) $\left(\frac{-qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\cdot\sqrt{2}a$ (4) $\left(\frac{qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\cdot\frac{a}{\sqrt{2}}$

Scan or tap for the full solution

Q.66 Two charges q_1 and q_2 are placed 30 cm apart, as shown in the figure. A third charge q_3 is moved along the arc of a circle of radius 40 cm from C to D.
The change in the potential energy of the system is $\frac{q_3}{4\pi\varepsilon_0}k$, where k is [AIPMT 2005]



(1) $8q_1$ (2) $6q_1$ (3) $8q_2$ (4) $6q_2$

Scan or tap for the full solution

Q.67 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]

(1) 5 kV (2) 50 kV (3) 5 V (4) 50 V

Scan or tap for the full solution

Q.68 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]

(1) 2q.E and minimum (2) q.E and p.E

(3) zero and minimum (4) q.E and maximum

Scan or tap for the full solution

Q.69 Three capacitors each of capacity 4 μF are to be connected in such a way that the effective capacitance is 6 μF. This can be done by [AIPMT 2003]

(1) connecting all of them in series

(2) connecting them in parallel

(3) connecting two in series and one in parallel

(4) connecting two in parallel and one in series

Scan or tap for the full solution

Q.70 Identical charges (−q) are placed at each corner of a cube of side b then electrostatic potential energy of charge (+q) which is placed at centre of cube will be [AIPMT 2002]

(1) $\frac{-4\sqrt{2}q^2}{\pi\varepsilon_0 b}$ (2) $\frac{-8\sqrt{2}q^2}{\pi\varepsilon_0 b}$

(3) $\frac{-4q^2}{\sqrt{3}\,\pi\varepsilon_0 b}$ (4) $\frac{8\sqrt{2}q^2}{4\pi\varepsilon_0 b}$

Scan or tap for the full solution

Q.71 Some charge is being given to a conductor. Then its potential is [AIPMT 2002]

(1) maximum at surface

(2) maximum at centre

(3) remains same throughout the conductor

(4) maximum somewhere between surface and centre.

Scan or tap for the full solution

Q.72 A capacitor of capacity C_1 charged up to V volt and then connected to an uncharged capacitor of capacity C_2. The final potential difference across each will be [AIPMT 2002]

(1) $\frac{C_1V}{C_1+C_2}$ (2) $\frac{C_2V}{C_1+C_2}$

(3) $\left(1-\frac{C_2}{C_1}\right)V$ (4) $\left(1+\frac{C_2}{C_1}\right)V$

Scan or tap for the full solution

Q.73 Energy per unit volume for a capacitor having area A and separation d kept at potential difference V is given by [AIPMT 2001]

(1) $\frac{1}{2}\varepsilon_0\frac{V^2}{d^2}$ (2) $\frac{1}{2\varepsilon_0}\frac{V^2}{d^2}$

(3) $\frac{1}{2}CV^2$ (4) $\frac{Q^2}{2C}$

Scan or tap for the full solution

Q.74 A capacitor is charged with a battery and energy stored is U. After disconnecting battery another capacitor of same capacity is connected in parallel to the first capacitor. Then energy stored in each capacitor is [AIPMT 2000]

(1) U/2 (2) U/4 (3) 4U (4) 2U

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	4	3	1	1	1	4	3	3	4	1	3
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	2	1	2	4	4	4	3	2	3	1	4
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	2	4	1	3	3	1	1	2	4	1	1
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	1	2	3	4	4	2	3	2	4	4	2
Ques.	45	46	47	48	49	50	51	52	53	54	55
Ans.	3	2	1	1	4	1	3	3	3	4	4
Ques.	56	57	58	59	60	61	62	63	64	65	66
Ans.	2	4	3	3	3	2	1	1	2	1	3
Ques.	67	68	69	70	71	72	73	74			
Ans.	2	3	3	3	3	1	1	2			

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