

PYQSide

NEET ELECTROSTATIC POTENTIAL AND CAPACITANCE — POTENTIAL DUE TO A POINT CHARGE, SYSTEM OF CHARGES AND DIPOLE — PYQS

Max. Marks: 52

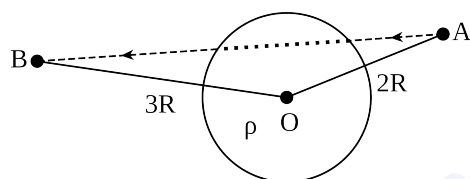
Questions: 13

Section A (MCQ)

- Q.1** 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 $\frac{\rho R^2}{n\epsilon_0}$. 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.2** 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) $\sqrt{\frac{Qq}{4\pi\epsilon_0 mR}}$ (2) $\sqrt{\frac{3Qq}{4\pi\epsilon_0 mR}}$
 (3) $\sqrt{\frac{2Qq}{3\pi\epsilon_0 mR}}$ (4) $\sqrt{\frac{Qq}{3\pi\epsilon_0 mR}}$

Scan or tap for the full solution



- Q.3 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, $4 \times 10^{-6}\text{ C m}$, is $\pm 9 \times 10^3\text{ V}$.

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

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 (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.4** The value of electric potential at a distance of 9 cm from the point charge $4 \times 10^{-7}\text{ C}$ is [Given $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9\text{ N m}^2\text{ C}^{-2}$]:

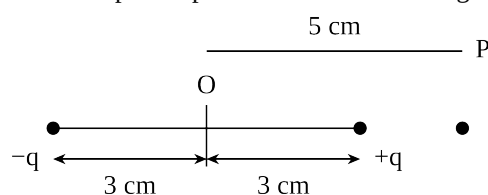
[RE-NEET (UG) 2024]

- (1) $4 \times 10^2\text{ V}$ (2) 44.4 V
 (3) $4.4 \times 10^5\text{ V}$ (4) $4 \times 10^4\text{ V}$

Scan or tap for the full solution



- Q.5** 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 $\frac{1}{4\pi\epsilon_0} = K$):

[NEET (UG) 2023]

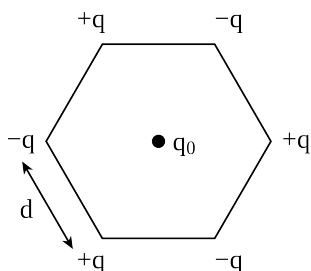
- (1) $\left(\frac{5}{8}\right)qK$ (2) $\left(\frac{8}{5}\right)qK$
 (3) $\left(\frac{8}{3}\right)qK$ (4) $\left(\frac{3}{8}\right)qK$

Scan or tap for the full solution



- Q.6** 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) $\frac{-q^2}{4\pi\epsilon_0 d} \left(6 - \frac{1}{\sqrt{2}} \right)$ (2) Zero
 (3) $\frac{-q^2}{4\pi\epsilon_0 d}$ (4) $\frac{-q^2}{4\pi\epsilon_0 d} \left(3 - \frac{1}{\sqrt{2}} \right)$

Scan or tap for the full solution



- Q.7** 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.8** 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 :

$$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2 \right) \quad \text{[NEET (UG) 2020]}$$

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

Scan or tap for the full solution



- Q.9** 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)]

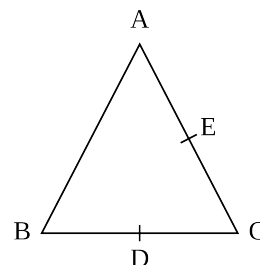
- (1) $Q = -q$ (2) $Q = -\frac{1}{q}$ (3) $Q = q$ (4) $Q = \frac{1}{q}$

Scan or tap for the full solution



- Q.10** 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)]

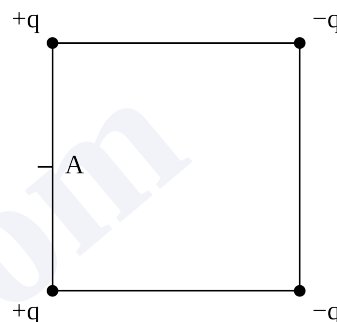


- (1) $\frac{3qQ}{4\pi\epsilon_0 a}$ (2) $\frac{3qQ}{8\pi\epsilon_0 a}$ (3) $\frac{qQ}{4\pi\epsilon_0 a}$ (4) zero

Scan or tap for the full solution



- Q.11** 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) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} (1 + \sqrt{5})$ (2) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} \left(1 + \frac{1}{\sqrt{5}} \right)$
 (3) $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} \left(1 - \frac{1}{\sqrt{5}} \right)$ (4) zero

Scan or tap for the full solution



- Q.12** Three concentric spherical shells have radii a , b and c ($a < b < c$) and have surface charge densities σ , $-\sigma$ 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]

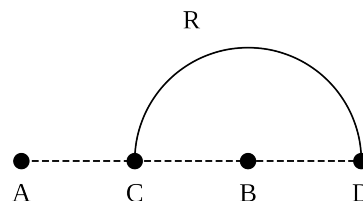
- (1) $V_C = V_B \neq V_A$ (2) $V_C \neq V_B \neq V_A$
 (3) $V_C = V_B = V_A$ (4) $V_C = V_A \neq V_B$

Scan or tap for the full solution



- Q.13** 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) $\frac{qQ}{2\pi\epsilon_0 L}$

(2) $\frac{qQ}{6\pi\epsilon_0 L}$

(3) $-\frac{qQ}{6\pi\epsilon_0 L}$

(4) $\frac{qQ}{4\pi\epsilon_0 L}$

Scan or tap for the
full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	1	4	3	4	4	2	1	1	1	4	3
Ques.	12	13									
Ans.	4	3									