Parishram (2025)

Physics

DPP : 3

Electric Charges and Fields

Q1 $+2\mathrm{C}$ and $+6\mathrm{C}$ two charges are repelling each other with a force of $12\ \mathrm{N}$. If each charge is given $-2\mathrm{C}$ of charge, then the value of force will be:
(A) $4\ \mathrm{N}$ (Attractive)
(B) $4\ \mathrm{N}$ (Repulsive)
(C) $8\ \mathrm{N}$ (Repulsive)
(D) Zero

Q2 Dielectric constant of pure water is 81. Its permittivity will be in MKG units:
(A) 7.17×10^{-10}
(B) 8.86×10^{-12}
(C) 1.02×10^{13}
(D) cannot be calculated

Q3 Two small conducting spheres of equal radius have charges $+10\mu\mathrm{C}$ and $-20\mu\mathrm{C}$ respectively and placed at a distance R from each other experience force F_1. If they are brought in contact and separated to the same distance, they experience force F_2. The ratio of F_1 to F_2 is:
(A) $1:2$ (B) $-8:1$
(C) $1:8$ (D) $-2:1$

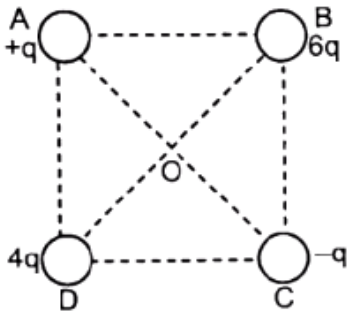
Q4 Two charges placed in air repel each other by a force of $10^{-4}\ \mathrm{N}$. When oil is introduced between the charges, the force on the charge becomes $2.5 \times 10^{-5}\ \mathrm{N}$. The dielectric constant of oil is:
(A) 2.5 (B) 0.25
(C) 2.0 (D) 4.0

Q5 Charge q_2 of mass m revolves around a stationary charge q_1 in a circular orbit of radius r. The orbital periodic time of q_2 would be
(A) $\left[\frac{4\pi^2\ \mathrm{mr}^3}{\mathrm{kq}_1\ \mathrm{q}_2}\right]^{1/2}$
(B) $\left[\frac{\mathrm{kq}_1\ \mathrm{q}_2}{4\pi^2\ \mathrm{mr}^3}\right]^{1/2}$
(C) $\left[\frac{4\pi^2\ \mathrm{mr}^4}{\mathrm{kq}_1\ \mathrm{q}_2}\right]^{1/2}$
(D) $\left[\frac{4\pi^2\ \mathrm{mr}^2}{\mathrm{kq}_1\ \mathrm{q}_2}\right]^{1/2}$

Q6 Two identical charges repel each other with a force equal to $10\ \mathrm{g}$-wt when they are $0.6\ \mathrm{m}$ apart in air. $\left(\mathrm{g} = 10\ \mathrm{ms}^{-2}\right)$ The value of each charge is:
(A) $2\ \mathrm{mC}$ (B) 2×10^{-7}
(C) $2\ \mathrm{nC}$ (D) $2\mu\mathrm{C}$

Q7 A charge q_1 exerts some force on a second charge q_2. If third charge q_3 is brought near, the force that q_1 exerts on q_2 and net force on q_2 respectively
(A) decreases, increases
(B) increases, increases
(C) remains unchanged, may increase or decrease
(D) remains unchanged, remains unchanged

Q8 Four charges are arranged at the corners of a square ABCD, as shown in the adjoining figure. The force on the charge q kept at the centre O is:



(A) zero
(B) along the diagonal AC
(C) along the diagonal BD
(D) perpendicular to side DC

Q9 Three charges $4q, Q$ and q are in a straight line in the position of $0, l/2$ and l respectively. The resultant force on q will be zero, if Q is:

(A) $-q$ (B) $-2q$
(C) $-\frac{q}{2}$ (D) $4q$

Answer Key

Q1	(D)
Q2	(A)
Q3	(B)
Q4	(D)
Q5	(A)
Q6	(D)
Q7	(C)
Q8	(D)
Q9	(A)

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Video Solution:

Q2 Video Solution:

Q4 Video Solution:

Q5 Video Solution:

Q6 Video Solution:

Q7 Video Solution:

Q8 Video Solution:

Q9 Video Solution: