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Physics

DPP: 2

Electric Charges and Fields

Q1 Five balls numbered 1 to 5 are suspended using separate threads. Pairs (1, 2), (2, 4) and (4, 1) show electrostatic attraction, while pair (2, 3) and (4, 5) show repulsion. Therefore ball 1 must be

(A) Positively charged
(B) Negatively charged
(C) Neutral
(D) Made of metal

Q2 A cylindrical conductor is placed near another positively charged conductor. The net charge acquired by the cylindrical conductor will be
(A) Positive only
(B) Negative only
(C) Zero
(D) Either positive or negative

Q3 When a piece of polythene is rubbed with wool, a charge of -2×10^{-7} C is developed on polythene. What is the amount of mass which is transferred to polythene?
(A) 5.69×10^{-19} kg
(B) 6.25×10^{-19} kg
(C) 9.63×10^{-19} kg
(D) 11.38×10^{-19} kg

Q4 The number of electrons in 2C of charge is
(A) 5×10^{29} (B) 125×10^{17}
(C) 1.6×10^{19} (D) 9×10^{11}

Q5 A comb rub through one's dry hair attracts small bits of paper. This is due to
(A) Comb is a good conductor
(B) Paper is good conductor
(C) The atoms in the paper get polorised by the charged comb
(D) The comb possesses magnetic properties

Q6 What is charge on $90\ \text{kg}$ of electrons?
(A) $158 \times 10^{13}\text{C}$
(B) $2.3 \times 10^{12}\text{C}$
(C) $2.53 \times 10^{12}\text{C}$
(D) None of these

Q7 Two identical spheres carrying charges $-9\mu\text{C}$ and $5\mu\text{C}$, respectively are kept in contact and then separated from each other. Point out true statement from the following. In each sphere
(A) 1.25×10^{13} electrons are in deficit
(B) 1.25×10^{13} elections are in excess
(C) 2.15×10^{13} electrons are in excess
(D) 2.25×10^{13} electrons are in deficit

Q8 There are two charges $+10\mu\text{C}$ having mass $10\,\text{mg}$ and $+5\mu\text{C}$ having mass $5\,\text{mg}$. The ratio of their accelerations under coulomb's force acting between them is:
(A) $1:2$ (B) $1:1$
(C) $2:1$ (D) $4:1$

Q9 F_g and F_e represents gravitational and electrostatic force respectively between protons situated at a distance $11\mu\text{m}$. The ratio of $\text{F}_\text{g}/\text{F}_\text{e}$ is of the order of:
(A) 10^{42} (B) 10^{36}
(C) 10^{-36} (D) 10^{-43}

Q10 Two charges each of $1\mu\text{C}$ are at a distance $1\ \text{cm}$ apart in vacuum, the force between them is
(A) $9 \times 10^3\ \text{N}$
(B) $90\ \text{N}$
(C) $1.1 \times 10^{-4}\ \text{N}$
(D) $10^4\ \text{N}$

Answer Key

Q1	(C)	Q6	(A)
Q2	(C)	Q7	(B)
Q3	(D)	Q8	(A)
Q4	(B)	Q9	(C)
Q5	(C)	Q10	(B)

Hints & Solutions

Note: scan the QR code to watch video solution

Q2 Video Solution:

Q3 Text Solution:

Number of electrons transferred, $n = q/e$

Mass transferred to polythene $= m_e \times n$

$$= m_e \times \left(\frac{q}{e}\right) = 9.1\times10^{-31} \times \left(\frac{2\times10^{-7}}{1.6\times10^{-19}}\right)$$

$= 11.38 \times 10^{-19}$ kg

Video Solution:

Q4 Video Solution:

Q5 Text Solution:

A comb rub through one's dry hair attracts small bits of paper due to the atoms in the paper get polarised by the charged comb.

Video Solution:

Q6 Video Solution:

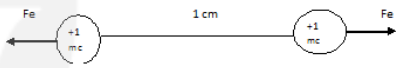
Q7 Video Solution:

Q8 Video Solution:

Q9 Video Solution:

Q10 Text Solution:

Two charges +1μC are kept 1 cm apart.



Electrostatic force between them,

$$F_e = \frac{1}{4\pi\varepsilon_\circ} \cdot \frac{q1 \cdot q2}{r^2}$$

$$= 9 \times 10^9 \times \frac{(1\times10^{-6})^2}{(10^{-2})^2}$$

$$= 9 \times 10 = 90\ N$$

Electrostatic force between two charges = 90 N

Video Solution: