Quiz 2

Phys 296: Summer, 2015

1. Describe the principle of conservation of electric charge. (5pt)

Charge (like energy) cannot simply disapears. It can transfer from one object to another. $Q_{Lost} + Q_{Gain} = 0$

Q_L is a (−) number

2. State three different methods to charge an object.(5pt)

Friction
contact
Induction

3. Give a detailed description of the correct and safe procedure to use a high voltage power supply in general and to charge the graphite-coated ping-pong ball. (5pt)

Do Not let your body touch Probe.
Turn off Power after using
One terminal of supply should be connected to ground.

4. We know that $Q = CV$ and $V = -\int_a^b \vec{E} \cdot d\vec{s}$. Find the capacitance of a hollow conducting sphere (the graphite- coated ping-pong ball) of diameter 3.75 cm. Show the derivation. (5pt)

$$V = -\int_0^R \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\,dr$$ for point charge = sphere

$E_{sphere} = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}$

$$V = \frac{1}{4\pi\varepsilon_0}\frac{Q}{R} \qquad Q = CV$$

$R 4\pi\varepsilon_0 V = CV$

$$\boxed{C = 4\pi\varepsilon_0 R}$$

$C = 0.2556\,\varepsilon_0$ ✓

$C = 2.058 \times 10^{-12}\ F$

$$\boxed{C = 2.08\ pF}$$