Answer on Question #61336-Physics-Electromagnetism

1) Calculate the potential difference between the plates of a parallel plate capacitor so that the gravitational force on a proton would be balanced by the electric field (proton mass = 1.67×10−27kg, electronic charge e=1.6×10−19C, plate separation is 0.5cm. Take g=9.8m/s2)

a) 1.4×10−6V

b) 2.0×10−6V

c) 1.7×10−6V

d) 3.2×10−6V

Solution

From 2nd Newton's law:

$$ma = 0 = mg - F_{el}$$

$$mg = eE = \frac{eU}{d}$$

$$U = \frac{mgd}{e} = \frac{1.67 \cdot 10^{-27} \cdot 9.8 \cdot 0.005}{1.6 \cdot 10^{-19}} = 5.1 \cdot 10^{-10} V.$$

2) Select the correct option from the following

a) electric field is a scalar quantity

b) electromotive force is a vector quantity

c) electric current is a scalar quantity

d) electric potential is a vector quantity

Answer: Electric current $I = \frac{dq}{dt}$. As both charge and time are scalars, therefore electric current is a scalar quantity. So, the correct answer is **c) electric current is a scalar quantity.**