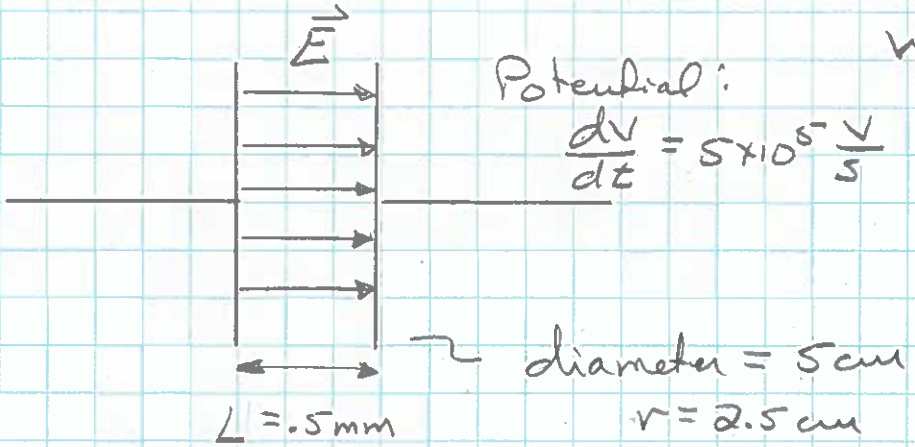

Displacement Current:

$$I_{disp} = \varepsilon_0 \frac{d}{dt} \int \vec{E} \cdot d\vec{A}$$

$$= \varepsilon_0 \frac{d}{dt} (E \pi r^2)$$

$$= \varepsilon_0 \pi r^2 \frac{dE}{dt}$$

Now, for a parallel plate capacitor (uniform $\vec{E}$)

$$V = EL$$

So: $$\frac{dE}{dt} = \frac{1}{L} \frac{dV}{dt}$$

$\therefore$ $$I_{disp} = \frac{\varepsilon_0 \pi r^2}{L} \frac{dV}{dt} = \underline{1.738\times10^{-5}\ A}$$