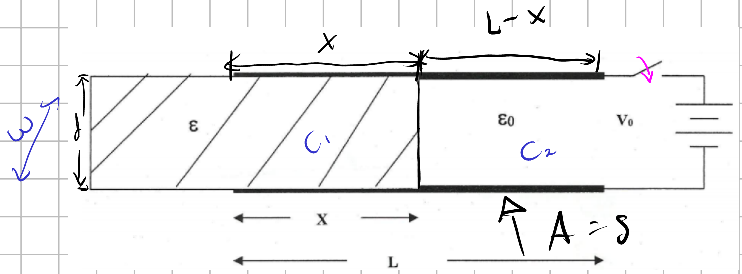
3-

$$C = K \epsilon_0 \frac{A}{d}$$

$$\varepsilon = K\epsilon_0$$



$$C_1 = \epsilon \frac{A_1}{d} \qquad C_2 = \epsilon_0 \frac{A_2}{d}$$

$$C_1 = \frac{\epsilon \cdot x \cdot \omega}{d} \qquad C_2 = \frac{\epsilon_0 \omega (L-x)}{d}$$

$$C_1 = \frac{K\epsilon_0 x \cdot \omega}{d}$$

$$C_{tot} = \frac{K\epsilon_0 x \omega}{d} + \frac{\epsilon_0 \omega (L-x)}{d}$$

$$F_x = \left(\frac{\partial U}{\partial x}\right)_V = \frac{1}{2} V_0^2 \left[\frac{\partial}{\partial x}\left(\frac{K\epsilon_0 x \omega}{d}\right) + \frac{\partial}{\partial x}\left(\frac{\epsilon_0 \omega (L-x)}{d}\right)\right]$$

$$F_x = \frac{1}{2} V_0^2 \cdot \frac{\epsilon_0 (K-1)\omega}{2d}$$

$$\epsilon = \epsilon_0 K$$

$$F_x = \frac{1}{2} V_0^2 \frac{(\epsilon_0 K - \epsilon_0)\omega}{2d}$$

$$F_x = \frac{1}{2} V_0^2 \frac{(\varepsilon - \varepsilon_0)\omega}{2d}$$