1 Double-Check Your Intuition

(a) $8.85 \cdot 10^{-12} F/m \cdot \frac{L_{\text{train}} W}{h}$ for both capacitances

Since $\epsilon_{air} = 8.85 \cdot 10^{-12}\ F/m$, so we have that $C = \epsilon \frac{A}{d} = 8.85 \cdot 10^{-12} F/m \cdot \frac{L_{\text{train}} W}{h}$

This is the capacitance between both T_1, M and T_2, M

Parts (b), (c), and more explanation/graph of (d) on the next page. Below is just the concluded equation for $V_{C_{eq}}(t)$ for more clarity.

(d) Equation:

$$V_{C_{eq}}(t) = \text{when } k\tau \leq t \leq (k+\frac{1}{2})\tau, \text{ then } \frac{I_1}{C_{eq}}(t-k\tau); \text{ when } (k+\frac{1}{2})\tau < t < (k+1)\tau, \text{ then } -\frac{I_1}{C_{eq}}(t-k\tau-\frac{\tau}{2})+\frac{I_1\tau}{2C_{eq}}$$