

ECE 2210 / 00

Exam 2

Useful Information

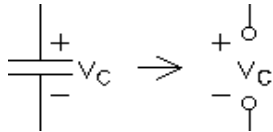
$$C = \frac{Q}{V} \quad \text{farad} = \frac{\text{coul}}{\text{volt}} = \frac{\text{amp} \cdot \text{sec}}{\text{volt}} \quad v_C = \frac{1}{C} \cdot \int_{-\infty}^t i_C dt = \frac{1}{C} \cdot \int_0^t i_C dt + v_C(0) \quad i_C = C \cdot \frac{d}{dt} v_C$$

parallel: $C_{eq} = C_1 + C_2 + C_3 + \dots$ **series:** $C_{eq} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots}$

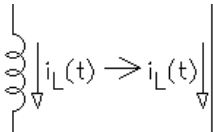
$$W_C = \frac{1}{2} \cdot C \cdot V_C^2 \quad \text{Capacitor voltage **cannot** change instantaneously}$$

$$\text{henry} = \frac{\text{volt} \cdot \text{sec}}{\text{amp}} \quad i_L = \frac{1}{L} \cdot \int_{-\infty}^t v_L dt = \frac{1}{L} \cdot \int_0^t v_L dt + i_L(0) \quad v_L = L \cdot \frac{d}{dt} i_L$$

$$W_L = \frac{1}{2} \cdot L \cdot I_L^2 \quad \text{Inductor current **cannot** change instantaneously}$$

Final Conditions: 

Replace capacitors with opens



Replace inductors with wires

For all first order transients: $x(t) = x(\infty) + (x(0) - x(\infty)) \cdot e^{-\frac{t}{\tau}}$ $\tau = R_{Th} \cdot C$ OR $\frac{L}{R_{Th}}$

Resonance: $\omega_0 = \frac{1}{\sqrt{L_{eq} \cdot C_{eq}}}$

Steady-state sinusoidal AC Impedances: $Z_C = \frac{1}{j \cdot \omega C} = \frac{-j}{\omega C}$ $Z_L = j \cdot \omega L$ $\omega = 2 \cdot \pi \cdot f$

$$A = |\mathbf{A}| = \sqrt{a^2 + b^2} \quad \theta = \arg(\mathbf{A}) = \text{atan}\left(\frac{b}{a}\right) \quad a = A \cdot \cos(\theta) \quad b = A \cdot \sin(\theta)$$