Mid Term Prep:

Look over Homework, Quizes, and Labs. In addition, you'll want to look over the attached "Quiz Prep" topic lists and equations that are reproduced on these pages and the Exam Equation Sheet which is at the end (a copy of which you'll be given with the exam). While doing all of this reviewing, ask yourself "what questions do I want addressed before I take an exam?" Bring those questions to class Thursday.

Study List for Quiz #1:

- Ohm's Law
- Series and parallel combinations of resistors and equivalent resistances.
- Power dissipation by a resistor.
- Kirchhoff's voltage (loop) law and current junction (node) law.
- Voltage divider (with a load).
- Thévenin's equivalent circuit theorem. (Reducing real voltage source/resistor networks to their Thévenin equivalent circuits.)

Equation List: [units in square brackets]

$V=IR$ $[1\text{ V}=1\text{ A}\cdot\Omega]$ $\qquad$ $P=IV$ $[1\text{ W}=1\text{ A}\cdot\text{V}]$

$R_S=R_1+R_2+\ldots$ $\qquad$ $\frac{1}{R_P}=\frac{1}{R_1}+\frac{1}{R_2}+\ldots$

Study List for Quiz #2:

1. Capacitors (series/parallel combinations).
2. Inductors
3. RC Circuit transients (charging and discharging)
4. RL Circuit transients

Equation List: [units are in square brackets]

$1/C_S = 1/C_1 + 1/C_2 + 1/C_3 + \ldots$ $\qquad$ $C_p = C_1 + C_2 + C_3 + \ldots$

$v_C = Q/\text{C}$ $[1\text{ V}=1\text{ C/F}]$ $\qquad$ $dv_C/dt = i/C$

$t_{RC} = RC$ $[1\text{ s} = 1\ \Omega\cdot F]$

$v_L = L(di/dt)$ $[1\text{ V} = 1\text{ H}\cdot\text{A/s}]$ $\qquad$ $t_{RL} = L/R$ $[1\text{ s}=1\text{ H}/\Omega]$

Study List for Quiz #3:

1. Sine waves – amplitude, frequency, angular frequency, period, and phase.
2. Reactances and impedances of R, L, and C - complex number (j-operator) representation.
3. Using the phasor representation to calculate the magnitudes and phase angles of voltages and currents.

Equation List:

$|X_C| = 1/wC = 1/2pfC$ $\qquad$ $Z_C = -j/wC = -j/2pfC$ $[1/(\text{Hz}\cdot\text{F}) = 1\Omega]$

$j = \sqrt{-1}$

$|X_L| = wL = 2pfL$

$Z_L = jwL = j2pfL$ $[1\text{Hz} \cdot \text{H} = 1\Omega]$

$w = 2pf$

$V = \sqrt{(V_{\text{real}})^2 + (V_{\text{imaginary}})^2}$

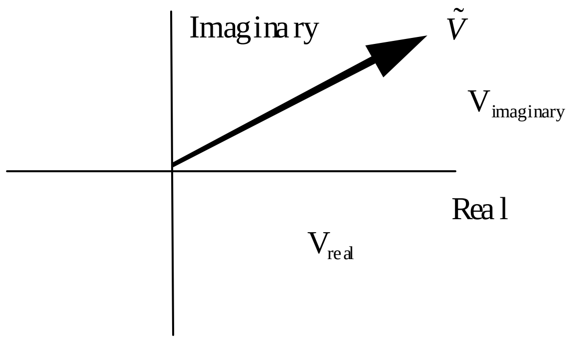
$f = \tan^{-1}(V_{\text{imaginary}}/V_{\text{real}})$

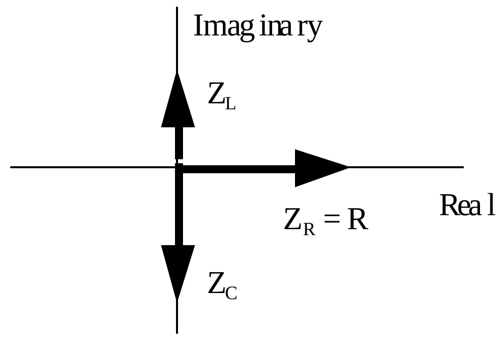
$\tilde{V} = Ve^{jf_V}$

$\tilde{A} \times \tilde{B} = A \times Be^{j(f_A + f_B)}$

$\tilde{A}/\tilde{B} = (A/B)e^{j(f_A - f_B)}$

$\tilde{v} = \tilde{i}\,\tilde{Z}$





Study List for Quiz #4:

4. Transformers
5. Impedance matching
6. I vs. V for diodes
7. Signal rectification, filtering, and voltage regulation

Equation List: [units in square brackets]

$$\frac{v_s}{v_p} = \frac{N_s}{N_p} \qquad P_p \approx P_s \qquad \frac{Z_s}{Z_p} = \left(\frac{N_s}{N_p}\right)^2$$

$$C \approx \frac{i}{\Delta V \cdot f} \; [\text{F} = \text{A}/(\text{V} \cdot \text{Hz})] \qquad r = \frac{\Delta V}{V_{DC}} \qquad V_p = \sqrt{2} \cdot V_{rms}$$

Study List for Quiz #5: The quiz will be on <u>Monday</u>, October 20.

8. Rules for the NPN bipolar junction transistors.
9. Simple transistor devices.

Equation List:

$$I_B = I_E - I_C \qquad I_C = bI_B \qquad V_E = V_B - 0.6 \text{ V}$$

Exam Equation Sheet

Equation & Units: [units in square brackets]

$V = IR$ $[1\ \mathrm{V} = 1\ \mathrm{A}\cdot\Omega]$ $P = IV$ $[1\ \mathrm{W} = 1\ \mathrm{A}\cdot\mathrm{V}]$

$R_S = R_1 + R_2 + \ldots$ $\dfrac{1}{R_P} = \dfrac{1}{R_1} + \dfrac{1}{R_2} + \ldots$

$1/C_S = 1/C_1 + 1/C_2 + 1/C_3 + \ldots$ $C_p = C_1 + C_2 + C_3 + \ldots$

$V_C = Q/C$ $[1\ \mathrm{V} = 1\ \mathrm{C/F}]$ $t_{RC} = RC$ $[1\ \mathrm{s} = 1\ \Omega\cdot\mathrm{F}]$

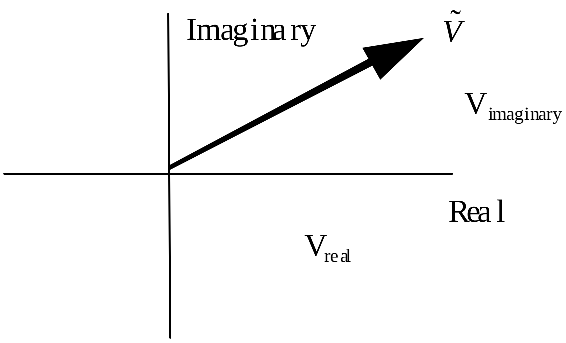
$V_L = L(di/dt)$ $[1\ \mathrm{V} = 1\ \mathrm{H}\cdot\mathrm{A/s}]$ $t_{RL} = L/R$ $[1\ \mathrm{s} = 1\ \mathrm{H}/\Omega]$

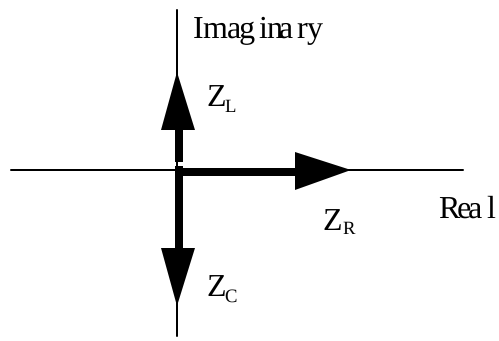
$|X_C| = 1/wC = 1/2pfC$ $Z_C = -j/wC = -j/2pfC$ $[\Omega = 1/\mathrm{Hz}\cdot\mathrm{F}]$ $j = \sqrt{-1}$

$|X_L| = wL = 2pfL$ $Z_L = jwL = j2pfL$ $[\Omega = \mathrm{Hz}\cdot\mathrm{H}]$ $w = 2pf$

$V = \sqrt{(V_{\mathrm{real}})^2 + (V_{\mathrm{imaginary}})^2}$ $f = \tan^{-1}(V_{\mathrm{imaginary}}/V_{\mathrm{real}})$ $\tilde{V} = Ve^{jf_V}$

$\tilde{A}\times\tilde{B} = A\times Be^{j(f_A+f_B)}$ $\tilde{A}/\tilde{B} = (A/B)e^{j(f_A-f_B)}$ $\tilde{v} = \tilde{i}\tilde{Z}$





$\dfrac{v_s}{v_p} = \dfrac{N_s}{N_p}$ $P_p \approx P_s$ $\dfrac{Z_s}{Z_p} = \left(\dfrac{N_s}{N_p}\right)^2$

$C \approx \dfrac{i}{\Delta V\cdot f}$ $[\mathrm{F} = \mathrm{A}/(\mathrm{V}\cdot\mathrm{Hz})]$ $r = \dfrac{\Delta V}{V_{DC}}$ $V_p = \sqrt{2}\cdot V_{rms}$

$I_B = I_E - I_C$ $I_C = bI_B$ $V_E = V_B - 0.6\ \mathrm{V}$