Date, Time and Location: Tuesday, May 13 from 1:30pm-4:30pm in MSEC 103.

Resources Allowed: Calculator, writing/erasing utensils and one 8.5"× 11" sheet of paper with writing on one side.

Chapters and Sections Covered: 8, 9.1-9.3, 10, 11.1-11.3

Note: All work must be shown neatly and completely for full credit.
Laplace Transform table will NOT be provided, make sure to include it on your sheet of paper.

Topics:

1. Circuit Analysis Techniques
   - mesh current, KVL, node voltage, KCL, Thevenin/Norton equivalent circuits, reduction, voltage and current division
2. Complex Numbers
   - rectangular ⇔ polar
   - sketch in complex plane
3. Sinusoids
   - definition including amplitude, frequency, and phase
   - common trig identities (Euler's formula, sum of angles, sine + cosine to cosine)
4. Sinusoidal and Damped Sinusoidal Analysis (steady-state)
   - development ((damped) sinusoids → complex exponentials → phasors)
   - phasors, phasor diagrams, impedances, complex frequency
   - convert circuit to frequency-domain representation
   - circuit analysis to find transfer functions, impedances, outputs, poles/zeros, or Thevenin/Norton equivalent circuits
5. Power
   - average power for sinusoids and general periodic signals
   - effective/rms value of periodic signals
   - maximum power transfer, apparent power, power factor, and complex power for circuits in sinusoidal steady-state
6. Frequency Response
   - transfer function magnitude and phase responses, and how they relate input and output sinusoids
   - half-power and resonant frequencies
   - sketch magnitude and phase responses
7. Bode Plots
   - understand basis (power, logarithms, dB)
   - sketch asymptotic approximation
   - sketch what "true" response might look like using Bode plot as guide
   - interpret plots as relationship between input and output sinusoids
8. Laplace Transform
   - $f(t) \Leftrightarrow \underline{F}(s)$ using definition, partial fraction expansion, and table
   - solve differential equations
   - convert circuit to frequency-domain representation
   - circuit analysis to find transfer functions, outputs, impedances
   - relate to steady-state results