UNIT 1
STUDY GUIDE*

To pass the unit exam, you must be able to do the following (using books and notes):

CONCEPTUAL TOOLS	Learning Objective	Reading
RLC CIRCUITS RLC CHAR ROOTS/DAMPING Series Parallel Overdamped roots Underdamped roots Critically damped roots Example (pdf)	1.1. Find the roots of the characteristic equation that describes any voltage or current in any series or parallel RLC circuit. Determine whether the response of a series or parallel RLC circuit is underdamped, critically damped, or overdamped.	Chap 8 Sec 8.1-8.2
RLC CIRCUITS RLC GENERAL SOLUTION Initial conditions	1.2. Evaluate the initial conditions of series and parallel RLC circuits.	Chap 8: Sec 8.3-8.4
RLC CIRCUITS GENERAL RLC SOLUTION Initial conditions Damping: over, under, critical sol'n forms Example 1 (pdf) Example 2 (pdf) Example 3 (pdf) Example 4 (pdf) Example 5 (pdf) **SUPERPOSITION** CIRCUITS Step + Natural response EXAMPLE (PDF)	1.3. Evaluate the arbitrary constants in the solution for any voltage or current in an RLC circuit.	Chap 8: Sec 8.3-8.4
STATE-SPACE METHOD CIRCUITS Initial conditions EXAMPLE 1 | (PDF) EXAMPLE 2 | (PDF)	1.4. Find and evaluate the state vector x at t = 0+ for a circuit with an arbitrary number of R's, L's, and C's; that is, evaluate the initial conditions of the state variables.	-
STATE-SPACE METHOD CIRCUITS State-space variables Equations EXAMPLE 1 | (PDF) EXAMPLE 2 | (PDF) Matlab® TUTORIAL | (PDF)	1.5. Write the first-order coupled differential equations for circuits in the form $d\mathbf{x}/dt = f(\mathbf{x}, t)$ where $\mathbf{x}$ is the state vector and t is time.	-

* The material in this handout is based extensively on concepts developed by C. H. Durney, Professor Emeritus of the University of Utah.