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
ALGEBRA SIMULTANEOUS EQUATIONS Example (pdf)	1.1 Solve linear simultaneous equations.	App A
CIRCUITS BASIC DC CIRCUITS Passive sign convention EXAMPLE 1 | (PDF) EXAMPLE 2 | (PDF)	1.2 Consistently label directions of currents and polarity of potential differences in any given circuit (including independent voltage sources and independent current sources, and dependent sources).	Chap 1: Sec 1.1-1.5
CIRCUITS BASIC DC QUANTITIES Power	1.3 Calculate power dissipated by circuit components as the product of current and voltage.	Chap 1: Sec 1.6
CIRCUITS BASIC DC CIRCUITS Sources: v, i indep, depend EXAMPLE 1 (PDF)	1.4 Use the concepts of both independent and dependent voltage sources and current sources in designing and analyzing circuits.	Chap 2: Sec 2.1
CIRCUITS OHM'S LAW Statement Series resistors Parallel resistors Resistor networks EXAMPLE 1 (PDF)	1.5 Calculate and/or estimate the equivalent resistance (conductance) of a combination of resistances (conductances). Use equivalent resistances (conductances) to reduce circuits.	Chap 2: Sec 2.2-2.3
CIRCUITS KIRCHHOFF'S LAWS Current sums at nodes | (pdf) Voltage loops | (pdf) Writing v and i eqns EXAMPLE 1 | (PDF) EXAMPLE 2 | (PDF)	1.6 Apply Kirchhoff's voltage and current laws to obtain equations relating voltages and currents in any given circuit.	Chap 2: Sec 2.4
CIRCUITS KIRCHHOFF'S LAWS Solving circuits EXAMPLE 1 (PDF) EXAMPLE 2 (PDF)	1.7 Apply Kirchhoff's and Ohm's laws to linear resistive circuits, solve for specified voltages and currents, and design circuits to given specifications, making consistency checks when appropriate. Apply Kirchhoff's and Ohm's laws qualitatively as well as quantitatively.	Chap 2: Sec 2.5
CIRCUITS OHM'S LAW Statement Series resistors Parallel resistors	1.8 Calculate and/or estimate the equivalent resistance (conductance) of a combination of resistances (conductances). Use equivalent	Chap 3: Sec 3.1-3.2

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

Resistor networks EXAMPLE 1 (PDF)	resistances (conductances) to reduce circuits.	
CIRCUITS V AND I DIVIDERS Voltage divider Current divider Example (pdf)	1.9 Apply voltage divider and current divider relations.	Chap 3: Sec 3.3-3.4
CIRCUITS NODE-VOLTAGE METHOD Example 1 (pdf) Example 2 (pdf) Example 3 (pdf) Matlab (txt) Example 4 (pdf)	1.10 Use the node-voltage method in analyzing and designing circuits.	Chap 4: Sec 4.1-4.4
OP-AMPS GOLDEN RULES $V_+ = V_-$ Zero input current EXAMPLE 1 (PDF) EXAMPLE 2 (PDF)	1.11 Analyze and design elementary op-amp circuits.	Chap 5
CIRCUITS THEVENIN EQUIVALENT Thevenin<->Norton xform EXAMPLE (PDF)	1.12 Transform current sources to voltage sources or vice versa and use these transformations in analyzing and designing circuits.	Chap 4: Sec 4.9
CIRCUITS THEVENIN EQUIVALENT Example (pdf)	1.13 Apply Thevenin's theorem and construct a Thevenin's model for a given circuit and find specified voltages and currents.	Chap 4: Sec 4.10-4.11