UNIT 3
STUDY GUIDE*

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

CONCEPTUAL TOOLS	Learning Objective	Reading
LAPLACE TRANSFORM STEP FUNCTIONS **EXAMPLE (PDF)**	3.1. Use step functions to express functions of limited duration.	Chap 12 Sec 12.1-12.2
LAPLACE TRANSFORM TRANSFORM PAIRS: **EXAMPLE (PDF)**	3.2. Find the Laplace transform of the functions of time commonly used in circuit theory.	Chap 12 Sec 12.4
LAPLACE TRANSFORM IDENTITIES: Example 1 (pdf) Example 2 (pdf) Example 3 (pdf)	3.3. Apply the operational transform identities commonly used in circuit theory, including differentiation, integration, translation in the time domain, translation in the frequency domain, and scale changing.	Chap 12 Sec 12.5-12.6
LAPLACE TRANSFORM INVERSE TRANSFORM Partial fractions EXAMPLE 1 (PDF) **EXAMPLE 2 (PDF)**	3.4. Find inverse Laplace transforms of rational functions of *s*, including those with complex and repeated roots.	Chap 12 Sec 12.7
LAPLACE TRANSFORM POLES AND ZEROS Example 1	(pdf) Example 2 (pdf)	3.5. Plot the poles and zeros of a rational function of *s* in the *s* plane.	Chap 12 Sec 12.8
LAPLACE TRANSFORM INITIAL/FINAL VALUE THMS **EXAMPLE (PDF)**	3.6. Apply the initial- and final-value theorems.	Chap 12 Sec 12.9
LAPLACE TRANSFORM CIRCUITS *s*-domain circuit elements Example (pdf)	3.7. Transform circuits (including initial conditions) to the s domain.	Chap 13 Sec 13.1
LAPLACE TRANSFORM CIRCUITS *s*-domain solutions EXAMPLE (PDF)	3.8. Apply Kirchhoff's laws and techniques used for resistive circuits to circuits in the *s* domain, including impedance relationships, super-position, and source transformations.	Chap 13 Sec 13.2
LAPLACE TRANSFORM CIRCUITS *t*-domain waveforms **EXAMPLE (PDF)**	3.9. Obtain expressions for specified voltages and currents in circuits in the *s* domain, and transform them to the time domain.	Chap 13 Sec 13.3

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

IMPULSE FUNCTION δ(t) DEFINITION IMPULSE IDENTITY CONVOLVE **LAPLACE TRANSFORM** CIRCUITS Impulse function **EXAMPLE (PDF)**	3.10. Analyze and design circuits that include impulse functions.	Chap 12 Sec 12.3 Chap 13 Sec 13.8
	3.11. Make consistency checks in *s* domain.	-