

Test #3 Overview

Chapters covered

- The following chapters and sections in Electric Circuits, 9th Edition by Nilsson
 - Chapter 4, Sections 9 – 13 (Homework #5)
 - Chapter 6 (Homework #6)
- Related Homework Assignments: HW #7-9

Chapter 4 Topics (65 – 70%)

Real voltage sources and real current sources

- Models
- Characteristics

Source transformations

- Not always possible
- Be careful to protect important circuit variables

Superposition

- Applies to voltage and current, but not to power
- Kill independent sources by:
 - Shorting voltage sources
 - Opening current sources
- Never kill a dependent source

Thevenin's and Norton's theorems – 3 key methods:

- Use source transformations to reduce the circuit into the form of a TEC or NEC
 - Not always possible
 - Not generally possible with dependent sources
- Find $R_{th} = R_{eq}$ (seen by the load with independent sources killed). Also find either V_{oc} or I_{sc} .
- Find V_{oc} and I_{sc} (most general method – always works).

Maximum power transfer theorem

- The first step is to find the TEC
- Max power occurs when $R_L = R_{th}$

- $$P_{max} = \frac{V_{th}^2}{4R_{th}}$$

Chapter 6 Topics (30 – 35%)

Physical properties, construction, models, typical values, basic types, combinations, etc.

Key relationships for v, i, p, and w

- Use the relationships with mathematical functions or with graphs

2 key facts for capacitors:

- Capacitor voltage cannot change instantaneously: $v_c(0^+) = v_c(0^-)$
- Capacitors act like *open circuits* in steady-state

2 key facts for inductors:

- Inductor current cannot change instantaneously: $i_L(0^+) = i_L(0^-)$
- Inductors act like *short circuits* in steady-state

Circuit analysis using the key facts listed above.