EGR 260
Circuit Analysis
File: N260O1

Test #1 Overview

Material covered

- Chapters 1 - 3 (omit section 3.5) in **Electric Circuits, 9th Edition** by Nilsson
- Homework Assignments 1-3

Format

- Problems will mainly be similar to class examples, textbook examples, and homework problems
- May include some multiple choice, fill-in-the blank, true/false, etc. (typically 15% or less)
- Number of problems: This varies, but 6-8 might be typical. Some problems may have multiple parts.
- Practice enough problems so that you can work them quickly or you may run short on time. Work the easiest problems first.

Chapter 1 Topics (≈1/3 of test)

Definitions and relationships for charge, current, voltage, power, and energy:

$$i(t) = \frac{dq(t)}{dt} \qquad q(t) = \int_0^t i(t)dt + q(0) \qquad v(t) = \frac{dW}{dq}$$

$$p(t) = \frac{dW}{dt} = v \bullet i \qquad w(t) = \int_0^t p(t)dt + w(0)$$

Problems might involve functions, graphs, or other information.
Correct units must be used. Also be familiar with SI prefixes.
The use of ***passive sign convention*** and ***active sign convention*** for calculating power absorbed or power delivered.
Calculating energy costs.

Chapter 2 Topics (≈1/3 of test)

Resistance

- Physical properties $R = \frac{\rho \cdot l}{A}$
- Ohm's Law
- Passive sign convention
- Power calculations
- Conductance

Voltage sources and Current sources

- Independent sources
- Dependent sources
- Combinations of sources

Kirchhoff's Voltage Law (KVL) – including sign convention
Kirchhoff's Current Law (KCL) – including sign convention
Series and Parallel elements

- Parallel elements have the same voltage
- Series elements have the same current

Power calculations in circuits ($P_{delivered} = P_{absorbed}$)

Chapter Topics (≈1/3 of test)

Resistive Circuits

- Series resistance
- Parallel resistance – general form and special form for 2 resistors
- Series/parallel combinations
- Equivalent resistance
- Voltage division
- Current division – general form and special form for two resistors in parallel

Balanced bridge circuit (when $R_1 \cdot R_4 = R_2 \cdot R_3$ the bridge is balanced and the current through $R_5 = 0$)
(See labeling of resistors in class notes or in the text.)

Y-Δ and Δ-Y Conversions – Equations and diagrams shown below will be provided.

Y-Δ Conversion Equations:

$$R_a = \frac{R_1 \cdot R_2 + R_2 \cdot R_3 + R_3 \cdot R_1}{R_1}$$

$$R_b = \frac{R_1 \cdot R_2 + R_2 \cdot R_3 + R_3 \cdot R_1}{R_2}$$

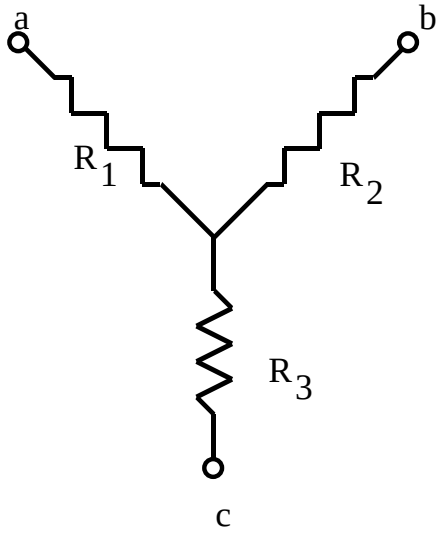
$$R_c = \frac{R_1 \cdot R_2 + R_2 \cdot R_3 + R_3 \cdot R_1}{R_3}$$

Δ-Y Conversion Equations:

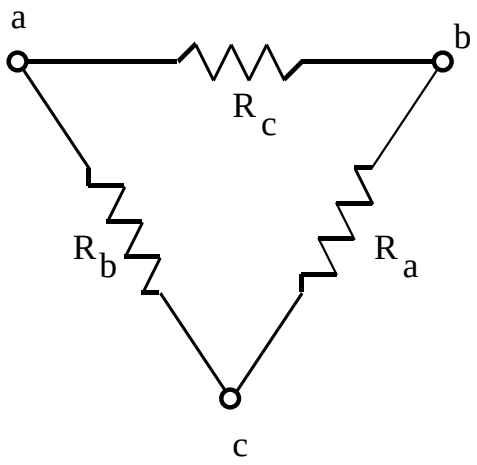
$$R_1 = \frac{R_b \cdot R_c}{R_a + R_b + R_c}$$

$$R_2 = \frac{R_c \cdot R_a}{R_a + R_b + R_c}$$

$$R_3 = \frac{R_a \cdot R_b}{R_a + R_b + R_c}$$



Wye Circuit



Delta Circuit