

ENGR-384  
Exam 2 notes

The emphasis of the exam will be on material that was not on the first exam. However there will be a couple topics that overlap with the first exam.

A topic that will again appear on exam 2 involves the application of ohms law. More specifically the concepts of voltage divider and loading. So review this. On page 25 of the textbook Kirchhoff current and voltage laws used to show a solution of a voltage divider with a load attached.

Also, know the resistance of two resistors R1 and R2 combined in series and also combined in parallel:

When R1 and R2 are in series,  $R_{\text{combined}} = R1 + R2$   
If R1 and R2 are in parallel,  $R_{\text{combined}} = (R1 * R2) / (R1 + R2)$

We did not directly cover chapter 3 of the textbook although we did touch on some of the topics covered in it.

In chapter 4 we discussed material from sections 4.1 thru 4.6.

Electrical activity of excitable cells

Resting state potential of internal medium with respect to external medium

Active state

Action potential

Potential overshoot

Cell membrane polarization

Cell membrane depolarization

Cell membrane hyperpolarization

Electromyogram

Electro Cardiogram

the ventricular cell

ventricular activation

Chapter 5 covers biopotential electrodes

Know what half-cell potential is, what it is referenced to, and its significance. I don't expect that you have memorized table 5.1 showing various half-cell potentials.

Know what polarization of an electrode is and how it might affect measurements.

Polarizable and nonpolarizable electrodes

What is the benefit of a silver/silver chloride electrode?

The electrode-skin interface and motion artifact

Metal plate electrodes

## Chapter 6

Biopotential amplifier characteristics - general. And more specifically the ECG amplifier.

Typical lead positions for a three-lead ECG measurement

Performance requirements for Electrocardiographs

- typical gain

- input impedance

- upper cutoff frequency

Sources of electric interference when attempting an electrocardiograph recording

Driven right-leg ECG system - what is it for, what does it do

Section 6.7, fig 6.18, shows an ECG amplifier similar to that used in lab. This circuit can be divided into multiple functions. What functions are performed by sections of this circuit?

## Chapter 14

Know what the physiological effects of electricity are when applied arm-to-arm to a human (figure 14.1).

- threshold of perception

- let-to current

- respiration paralysis, pain, and fatigue

- ventricular fibrillation

- sustained myocardial contraction

Know what current level could cause fibrillation if applied between a catheter inserted near the heart and an arm.

Macro-shock      know current limits

Micro-shock      know current limits

Limits on leakage current of electric appliances table 14.1