Summary of material for EE 341 Exam # 1

The following are some of the important topics to be included for Exam #1, however, this is not necessarily a complete list; the material covered in the exam will generally be based on topics discussed in class and principles illustrated in the homework, with a lesser emphasis on material assigned but not covered in class discussion.

Refer to EE 341 home page for links to files with corrections to the textbook – both 3rd Ed. and 4th Ed.

Appendix A: Review of three-phase circuits (additional reference: Three-phase Nomenclature on WWW)

- Relationship between time-domain and phasor representations
- Balanced positive sequence; balanced negative sequence
- Relationships between line (-line) voltages and phase voltages for wye and delta configurations
- Relationships between line and phase currents for wye and delta configurations
- Phasor diagrams
- Complex power: single-phase and three-phase (also covered in Sec. 1.9 of 4th Ed.)
  - \[ S_φ = V_φ I_φ^* \] [note: \( S_φ, V_φ \) and \( I_φ \) are complex quantities; \( I_φ^* \) denotes conjugate]
  - Power triangle

Chapter 1: (Sections 1.4 to 1.9) (May be beneficial to review units & nomenclature in Sec. 1-2 & 1.3)

- Linear DC machine & associated relationships
- Magnetic reluctance (\( R \)) \[ R = l/(\mu A) \]
- B-H curve; permeability (\( \mu \))
- Relationship between inductance (\( L \)) and reluctance (\( R \)) \[ L = N^2/ R \]
- Core losses: hysteresis and eddy current
- Faraday’s law
- Complex power

Chapter 2: Transformers [will cover only sections 2.1, 2.2, 2.3, 2.4, 2.5, 2.7, 2.10, 2.12]

- Ideal transformer relationships (Sec. 2.3)
- Practical model of transformer: include effect of windings and magnetic core
- Equivalent circuit of single-phase transformer; refer to either winding
- Use open circuit and short circuit test to determine equivalent circuit parameters
- Analysis of transformer operation: voltage regulation (with phasor diagram) & efficiency
- Analyses of simple system with transformer, load, line and source.
- Per unit system – only very basics -- did not go over in class, will not be covered on Exam #1.
- 3-phase transformer connections – consider only ideal case – did not go over in class.
- Transformer ratings (Sec. 2-12); similar for other equipment covered in this course.

Chapter 3: Introduction to Power Electronics [will not cover on Exam #1]

Chapter 4, 5, 6: Synchronous Machines (refer to handout for Sync. machine coverage)

- Physical construction
- Magnetic flux distribution – speed-frequency relationship
- Equivalent circuit & phasor diagram – generator action only