

EE 3120 - Test 2 Review Checklist

Coverage: Anything covered since Test 1. All Lectures, material in text from Lecture 21 onward, info posted on web page, course handouts, homework, and quizzes. You continue to be responsible for circuit analysis concepts used throughout this course. A large listing (which is not necessarily complete) is provided as follows:

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Concepts: be able to explain and apply

- Double-subscript notations, active vs. passive
- Power Triangle, Impedance Triangle
- Leading vs. Lagging PF, PF angle θ
- Power: Apparent (S), Average (P), Reactive (Q)
- Voltages: L-N, L-L ("line"), phase voltage in Y or Δ
- Currents: phase currents in Y or Δ , line currents
- Balanced 3-phase loads: Y or Δ or "black box"
- Balanced 3-phase sources: Y or Δ or "black box"
- Power factor correction - why and how
- Voltage phasor diagrams: "open" vs. "closed"
- Per phase analysis
- Ampere's Circuital Law $\text{MMF} = \mathcal{F} = Ni = \mathfrak{R}\phi$
- Magnetic Permeability $\mu = \mu_r\mu_0$
- Mean path length, Cross-sectional area
- Magnetic Reluctance \mathfrak{R} , Permeance \wp
- Magnetic Flux, ϕ
- Magnetomotive Force, MMF or \mathcal{F}
- Magnetic Flux Density, B
- Magnetic Flux Intensity, H
- Flux Linked λ , Inductance L
- Fringing around air gap, leakage
- Magnetic Saturation
- Why use laminations?
- Ideal transformer, induced voltage
- Polarity markings, Lenz's Law
- Turns ratio, voltage ratio, current ratio
- Non-ideal transformer behaviors
- Winding resistance
- Leakage reactance
- Core loss resistance
- Magnetizing Reactance
- Three phase transformer banks, deltas, wyes
- Effective turns ratio of 3-phase bank
- Induction machines
 - Physical construction, features
 - Stator, rotor, armature, air gap, etc.
 - Stator B-field, synchronous speed
 - Slip, rotor speed, rotor frequency
 - Explain how it works
- Induction Generator vs. Induction Motor
- Wound rotor vs. squirrel-cage rotor

Calculations, Determinations:

- Phasor Analysis Methods Used Throughout:
 - Calculations involving V, I, P, Q, S, Z, R, X, θ , ϕ for single phase 60-Hz circuit
 - Calculate V, I, PF, S, P, Q, using phasor diagrams and power triangles as visual aid.
 - Calculate phasor line currents flowing into single-phase or 3-phase sources and loads.
 - Determine phasor line currents flowing into "black box" load.
 - Per phase analysis of 3-phase circuits
- Calculate V, I, P, Q, S, Z, R, X, θ , ϕ for 3-phase transformer bank, delta and wye connections.
- Power factor correction: by adding capacitors

Format: With larger sections it is unfortunately necessary to establish a clear detailed test-taking procedure. Here is what to expect:

The test will be 4-6 pages long, with a cover sheet. The test is designed to be a 50-min test, but if everyone is in place on time, we can have as much as 60 minutes. Do not open the test booklet, look at problems, or begin to work on it until everyone has received one and you are told to begin. Problems may be either calculation or short essay/explanation. Space for working problems is provided on the test - no additional sheets of paper (except for one hand-written sheet of notes/equations) are allowed on your desk. Your note sheet can contain equations and notes about important concepts. Not allowed are complete problems with solutions that can be copied. A stapler will be provided - when you hand in your test, staple the note sheet to the back.

Sit in every other seat in each row, forming columns. Set your cell phone on silent. No wireless communications devices may be used during the test. To avoid any possible appearance of MTU Academic Integrity concerns (i.e. cheating) it is best to just avoid questionable situations. So, please focus on your own paper as much as possible, and avoid talking or straying eyes. It's ok to wear a baseball cap, but turn the brim backwards. Avoid wearing dark glasses. If you have a question, raise your hand and clear your throat and I'll come directly to your desk. Questions are encouraged - if there is a typo or a clarification is needed, then it's best to share it with the whole class as soon as possible.