Listing of possible topics for final exam by chapter-

Chapter 8 Magnetic Forces, Materials, and Devices

- Magnetic Circuits

Chapter 9 Maxwell's Equations

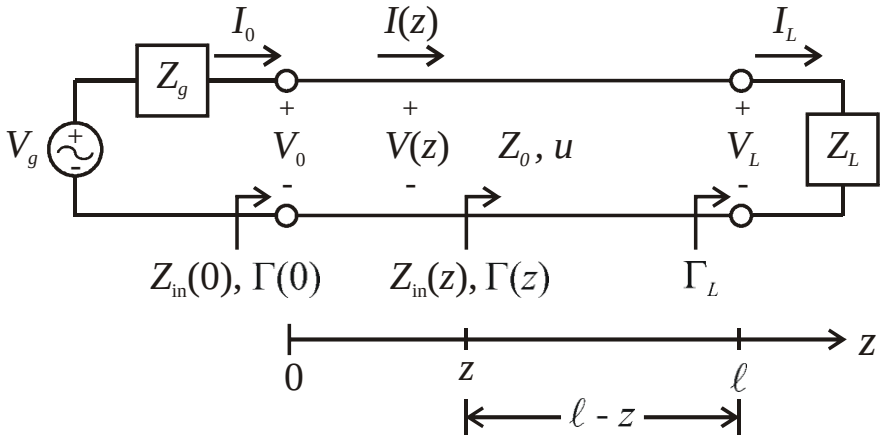
- Faraday's Law- Lenz's Law, transformer, motional/flux-cutting, & both emfs
- Ampere's Law & Displacement current
- Boundary conditions- electric and magnetic w/ time-varying fields
- Maxwell's equations for time-harmonic case, e.g., $\bar{E}_s \leftrightarrow \bar{H}_s$, loss tangent, …

Chapter 10 Electromagnetic Wave Propagation

- Calculate propagation constant γ, attenuation constant α, phase constant β, wavelength λ, period T, intrinsic impedance η, phase velocity u, skin depth δ, loss tangent $\sigma/\omega\varepsilon$, …
- $\bar{E}_s \leftrightarrow \bar{H}_s$ for UPWs
- Poynting vector- both instantaneous and time-average
- Reflection/transmission of plane waves at normal incidence to planar material interfaces

Chapter 11 Transmission Lines (frequency-domain lossy)

- Calculate distributed transmission line parameters *R, L, G,* & *C* (i.e., per-unit-length) for common transmission lines such as coaxial, twin-wire, and planar line
- Calculate propagation constant γ, attenuation constant α, phase constant β, wavelength λ, period T, characteristic impedance Z_0, phase velocity u, … for general as well as lossless, low loss, & distortionless cases
- Make calculations for lossy transmission line circuits, e.g., phasor currents and voltages, power, reflection coefficients, VSWR (lossless case), …



Chapter 11 Transmission Lines (Smith charts for frequency-domain lossless case)

- Use Smith chart to find z_{in}/Z_{in}, y_{in}/Y_{in}, Γ_{in}, Γ_L, VSWR, r_{max}, r_{min}, … for lossless transmission line circuits
- Use Smith chart to match loads to transmission lines using: quarterwave transformers, parallel discrete loads (L or C), series discrete loads (L or C), and single parallel short or open circuit stubs

Chapter 11 Transmission Lines (time-domain)

- Analyze lossless transmission line circuits with resistive source & load impedances with step or pulse inputs
- Be able to draw and use **bounce diagrams**, e.g., V_{init}, I_{init}, Γ_g, Γ_L, transit time T, … to find current or voltage at fixed location versus time **AND** current or voltage at fixed time versus location.
- Be able to find steady-state current or voltage for circuits with step input
- Time-domain reflectometer problems, e.g., find l & Z_L and/or u & Z_0

Chapter 13 Antennas

- Given electric &/or magnetic fields, find power density/Poynting vector and power radiated P_{rad}, radiation intensity U as function of angle, average, & maximum, directivity/directive gain as function of angle & maximum, and gain AKA: (power gain) as function of angle & maximum.
- Radiation efficiency, half-power beamwidth, and effective area
- Friis transmission formula problems
- RADAR equation and/or RADAR range equation problems