Eng Ps 172, Exam 1

Date: 24 September Thursday, class time.

0. Maxwell's Equations: differential and integral form. Dimensions of quantities. Vector and scalar field notation will be enforced. $\vec{E}$ is the vector field notation, $E = |\vec{E}|$.

1. Uniform Plane Waves as solutions to the Infinite Plane Sheet Antenna
- direction of motion
- polarization: linear, circular (RCP, LCP), elliptical
- what sheet current densities in an infinite plane antenna, will produce what Electric and Magnetic field polarizations
- $\vec{S} = \vec{E} \times \vec{H}$

2. Wave Equation
- solutions in space and time
- solutions in the complex domain

3. Dielectric
- index of refraction
- how wavelength changes in a dielectric
- how the phase velocity changes in a dielectric

4. Good Conductor
- skin depth
- other implications, frequency dependence of quantities

5. Field reflection coefficient Γ or r, as well as the field transmission coefficient τ or t.
- normal incidence (in the future, we should also be able to understand non-normal incidence)
- Fabry Perot.
- Recitation (Power Transmission through a Fabry Perot etalon made of [a] GaAs of thickness 2 mm, [b] fused silica quartz 1 mm thickness). Submit by Tuesday 22 Sep to nlibatique@ateneoinnovation.org. For each case, what is the "free spectral range"? what is the "finesse"? Submit ppt slide of the plots, matlab/python/mathematica code, individual work.
- know how to derive field (electric, magnetic) reflection and transmission coefficients. know how to derive power reflectance and/or transmittance R and T from the field γ and τ coefficients.

6. BBC Documentary 'The Fantastic Mr. Feynman and Chapter 1 volume 2 of The Feynman Lectures on Physics.