CMPE 330   Spring 2015   Second Midterm Examination

(Each problem is worth 10 points)

1. Consider a transmission line with $Z_0 = 100 \ \Omega$ and $Z_L = 200 \ \Omega$. What is the standing wave ratio? Measured in wavelengths, how close are the first maximum and the first minimum to the load?

2. Consider a transmission line with a characteristic impedance of 50 Ω and a load impedance of 50 Ω. Suppose that the generator impedance is also 50 Ω and $\tilde{V}_s = 100$ V. How much power is dissipated in the load resistor and how much power is dissipated in the source resistor?

3.   a. Give the definition of the divergence operator.

   b. Use the definition of the divergence operator to obtain its form in the Cartesian coordinate system.

4. Show that the energy density inside a parallel plate capacitor is equal to $(1/2)\epsilon E^2$, where ϵ is electric permittivity of the dielectric between the plates.

5. Consider the motion of a particle with charge q and mass m in uniform and constant electric and magnetic fields.

   a. Write the equation of motion

   b. When the magnetic field strength is zero, show that the position of a particle starting from rest will increase proportional to t^2.