ECE 4391 Electromagnetic Compatibility Quiz 3
July 17, 2002

Professor Leach   Name_____

Instructions. Print your name in the space above and at the top of all other pages in your quiz. Be brief with your answers. Draw simple diagrams when appropriate to illustrate your answers. The quiz is closed notes. You may use your calculator provided no stored data is retrieved from it, i.e. use it only for numerical calculations. **Honor Code Statements:** *I have neither given nor received help on this quiz.* Initials _____

1. The absorption loss at 10 kHz in a particular metal shield of thickness 0.16 cm is 12 dB.

    (a) What is the skin depth of the shield in cm at 10 kHz?

    (b) If the frequency is doubled, what is the new absorption loss of the shield?

2. The skin depth for copper at 1 kHz is 0.082 in (multiply by 2.54 to get cm). Calculate the shielding effectiveness of a 0.03 inch thick copper shield located 3 cm from a source of a 1 kHz magnetic field.

3. (a) Describe a method of protecting a transistor switch that drives an inductive load. (b) Describe a method of protecting the contacts of a switch having a load with a high inrush current.

4. (a) What is the basic requirement for avoiding a glow discharge between contacts? (b) What is the basic requirement for avoiding an arc discharge between contacts?

5. A circuit consists of a resistor $R_1 = 100$ kΩ in series with a capacitor $C = 0.001$ μF. In parallel with the series RC circuit is a second resistor $R_2 = 300$ kΩ. Calculate the spot thermal noise voltage $\sqrt{v_t^2/B}$ across the circuit at the frequency $f = 1$ kHz.