PHYSICS 242 BLOCK 7 DRILL SET, SPRING '17 NAME _____

Slide this paper under Marteena 308's door any time *before* 7:50 AM Friday, March 3, or give it to me in Marteena 312 *by* 8:00 AM that day. Use one different equation from the Block 7 objectives per problem.

1. Two coils have a mutual inductance of 55.1 mH. Find the mutually-induced emf in coil 1 at t = 3.45 ms, when the current in coil 1 is constant at 1.111 A and the current through coil 2 is decreasing at a rate of –2120 A/s.

ONE EQUATION USED | SOLUTION | ANSWER

2. What magnitude magnetic field would be required to store one hundred kilowatt-hours (360 MJ) of magnetic potential energy in each cubic meter of vacuum or nonmagnetic material?

ONE EQUATION USED | SOLUTION | ANSWER

I use μ = _____

and u = _____.

3. Coil 1 has 101 turns and coil 2 has 202 turns. When a constant current of 1.111 A flows in coil 1 and *no* current flows in coil 2, the average magnetic flux from this 1.111 A current is 0.707 mWb through each turn of coil 1 and 0.303 mWb through each turn of coil 2. (Of course, the zero current in coil 2 gives zero magnetic flux through each turn of each coil.) Find the numerical value of the mutual inductance of the two coils.

EQUATION USED (**ONE** = SIGN) | SOLUTION | ANSWER

=

4. Use the data in Problem 3 above to find the numerical value of the self-inductance of one of the two coils. (The self-inductance of the other coil is indeterminate because zero current gives zero magnetic flux.)

EQUATION USED | SOLUTION | ANSWER

The self-inductance

of coil _____ is

_____.

5. The electric flux is (5.0 V·m/s^4)t^4 through a certain area of a dielectric. Its dielectric constant is 2.8 so its permittivity is 2.5×10^{-11} F/m. Find the displacement current through that area at t = 3.0 s.

EQUATION USED | SOLUTION (SHOW *ALL* YOUR WORK.) | ANSWER