Practice Exam #3 PS250

June 23, 2006 Dr. Darrel Smith

Show your work !!

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Name

10 points

1. A rectangular copper loop 5.00 cm by 20.0 cm is located in a region of changing magnetic field. The direction of the magnetic field makes an angle of 37^o with the plane of the loop. The time-changing field has the following time dependence: $B(t) = 0.10\ T + (1.00 \times 10^{-3}\ T/s)\ t$. Find the induced emf in the copper loop for times $t>0$.

emf = _____ volts

10 points

2. A long, narrow solenoid with radius 2.50 cm and 1000 turns/meter has a thin circular copper wire of radius 1.50 cm centered on the axis of the solenoid. The time rate of change of the current in the solenoid is 60 A/m. If the plane of the thin copper wire makes an angle of 60^o with respect to the magnetic field in the solenoid, calculate the following:

   a. The induced emf in the thin circular copper wire.

emf = _____ μV

   b. The current induced in the thin circular copper wire if the resistance of the wire is 0.020 Ω.

I = _____ mA

   c. If you want to reduce the emf by a factor 2, what angle ϕ should you position the plane of the copper wire with respect to the magnetic field?

ϕ = _____ degrees