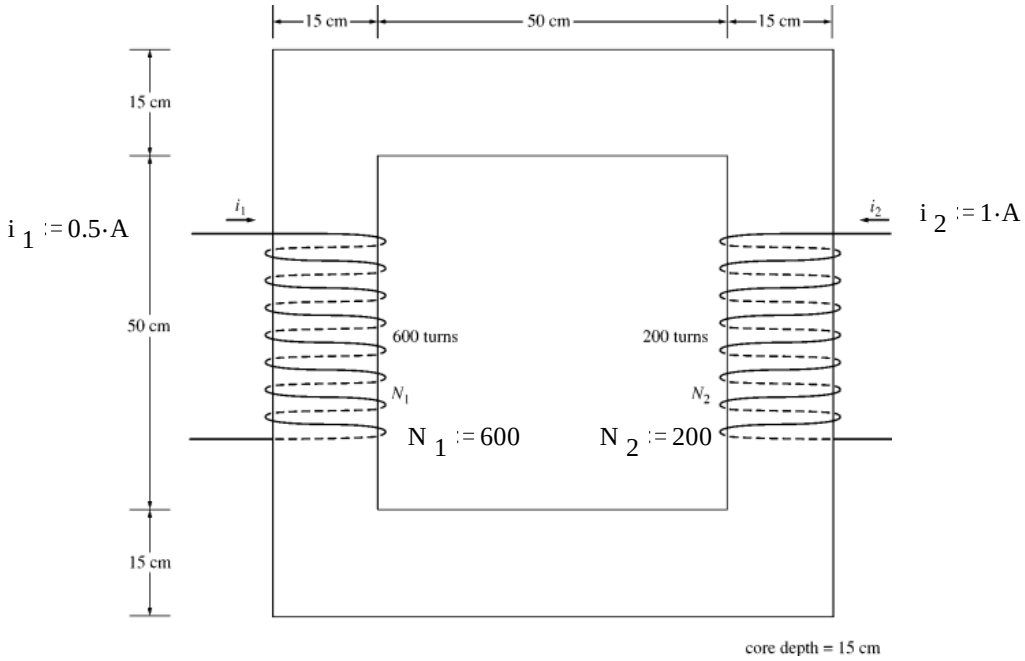
Name_____ ECE 3600 Homework 6 Electromagnetics c

Due: Fri, 9/13/24

1. Textbook problem 1-7 (p49)

A two-legged core is shown in below. The winding on the left leg of the core (N_1) has 600 turns, and the winding on the right (N_2) has 200 turns. The coils are wound in the directions shown in the figure. If the dimensions are as shown, then what flux would be produced by currents $i_1 = 0.5$ A and $i_2 = 1.00$ A? Assume $\mu_r = 1000$ and constant.



2. Textbook Example 1-2 (p20) with:

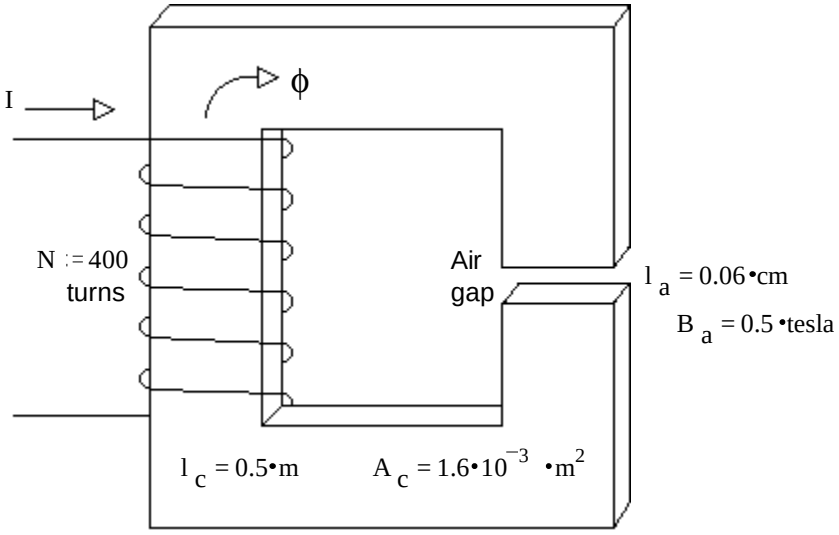
Mean magnetic length: $l_c := 50 \cdot cm$ Air gap length: $l_a := 0.06 \cdot cm$

Core cross-sectional area: $A_c := 16 \cdot cm^2$ Relative permeability of core: $\mu_r := 4000$

Effective air-gap cross-sectional area is 5% more than the core.

a) Find the total reluctance of the core with the air gap. $\mathcal{R}_{eq}$ = ?

b) Find the required current so that the flux density of in the air gap is: $B_a := 0.5 \cdot tesla$ I = ?



Answers

1. $0.0054 \cdot Wb$

2. a) $3.464 \cdot 10^5 \cdot \frac{A \cdot turns}{Wb}$ b) $727 \cdot mA$