Sciences and Technology Department
2nd year (2023-2024), semester 3
Electrotechnique –Automatique – Electromécanique –Télécom- Electronique

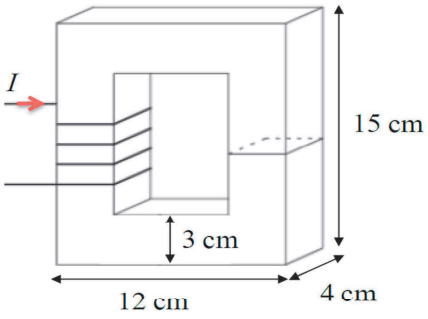
Module: Fundamental Electrical Engineering 1

TD N/04

Exercice 01 :

Consider the following magnetic circuit, the relative permeability of the material is μ_r=3000, the number of turns is N=300 turns. This magnetic circuit carries a current of 1.2 A.

1. Calculate the geometric parameters of the circuit (average length and section).
2. Calculate the reluctance of this circuit? With $\mu_0=4\pi\ 10^{-7}$ H/m
3. Calculate the magnetic flux, then deduce the magnetic induction?



Exercice 02 :

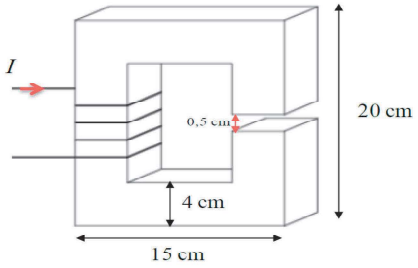
Consider the following circuit, the current intensity is 2 A, the relative permeability of the material is μ_r=2500 with an air gap thickness of 0.5 cm, the number of turns is 250.Knowing that the depth is 4 cm, calculate:

1. Calculate the geometric parameters of the circuit (average length and section).
2. Give the equivalent electrical diagram?
3. Calculate the reluctance of this circuit (material and air gap)?
4. Calculate the magnetic flux, then deduce the magnetic induction?

Soit le circuit suivant, l'intensité de courant est 2 A, la perméabilité relative du matériau est μ_r=2500 avec un entrefer d'épaisseur de 0,5 cm, le nombre de tours est 250.

Sachant que la profondeur est de 4 cm, calculez :

1. Calculez les paramètres géométriques du circuit (longueur moyenne et section).
2. Donnez le schéma électrique équivalent ?
3. Calculez la réluctance du ce circuit (matériau et entrefer)?
4. Calculez le flux magnétique, déduire alors l'induction magnétique ?



Exercice 03 :

A torus-shaped magnetic circuit, μ_r=700 (unsaturated) with interior radius R_i=10 cm and exterior radius R_e=15 cm, carries a winding of 300 turns, knowing that the intensity of the current in the winding is 4 A, we are asked to determine:

1) The magnetic field H, the magnetic induction B and the magnetic flux φ, in the case where the magnetic circuit is without air gap;
2) Same question in the case where the magnetic circuit has a 2 mm gap

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