

## Test 5 Review - Electromagnetism

Be able to **identify, define, describe, discuss** and **apply** the following topics and terms:

Permanent Magnet

Ferromagnetic

Magnetic Domains

Magnetic Poles

The Earth's Magnetic Field

Compass

Magnetic Field Lines

Solenoid

Electromagnet

Force on a charge in a B-field

B-field around a current carrying wire

Force on a current carrying wire

Electromagnetic Induction

Generator

Motor

Speaker

Microphone

Faraday's Law

Power Transformers

Lenz's Law

### Formulas

$$F_m = q v B$$

$$F_m = B I \ell$$

$$P = VI$$

$$P_{IN} = P_{OUT}$$

$$V_{IN}I_{IN} = V_{OUT}I_{OUT}$$

$$V_s = \frac{N_s}{N_p} V_p$$

1. A proton moves at  $2.5 \times 10^6$  m/s horizontally to the east at a right angle to a magnetic field. What is the strength of the magnetic field required to exactly balance the weight of the proton (mass =  $1.67 \times 10^{-27}$  kg) and keep it moving horizontally? What direction should the magnetic field point?
  
2. Find the direction of the force
  - on a proton moving upwards in a magnetic field that points into the page.
  
  - on a proton moving upwards where the B-field points to the right
  
  - on a proton moving to the left and the B-field points downward
  
  - on a proton moving out of the page and the B-field points downward.
  
3. Repeat the above examples for an electron.
  
4. A proton ( $q = 1.6 \times 10^{-19}$  C) moves at a speed of  $2 \times 10^7$  m/s towards the right into a magnetic field of 3 T that is pointing out of the page. What is the magnitude and the direction of the force acting on the proton?
  
5. A current of 15 A is moving through a wire of length 5 meters which is perpendicular to a uniform magnetic field. The wire experiences a magnetic force of 0.6 N. What is the magnitude of the B-field that puts a force on this wire?
  
6. A power transformer has 10000 coils in the primary and 1000 coils in the secondary. Is this a step up or step down transformer? By how many times does it step up or down? What does it step up, current or voltage? If 120 V and 1 Amp of current are run into the primary how much voltage is induced in the secondary? How much current will there be? How much power is put into the transformer? How much power will be produced?

**STUDY YOUR NOTES!!!!!!**

**THIS REVIEW SHEET IS NOT THE END-ALL-BE-ALL OF STUDYING!!**