Pre-Lab: Current Balance

Name:

Multiple choice. Choose the best answer. (10 points possible)

1. What is the magnitude of the Lorentz force? [1 pt]
   a. \( F = I L \times B \)   b. \( F = I L B \sin \theta \)  c. \( F = I L B \)  d. None of these.

2. In the Lorentz force equation, which direction does the length vector, \( L \), point? [1 pt]
   a. up   b. down   c. in the direction of the current   d. None of these.

3. In equation 2, \( \theta \) is the angle between ______. [1 pt]
   a. \( I \) and \( L \)   b. \( L \) and \( B \)   c. \( F \) and \( B \)   d. None of these.

4. In this experiment, the angle \( \theta \) is assumed to be ______. [1 pt]
   a. perpendicular to the direction of current flow.  b. 90°  c. 0°

5. Look at figure 7-1 in your lab manual. The direction of \( F \) depends on the directions of \( B \) and \( L \), as defined by the right hand rule for cross products (see lecture textbook or ask professor). Assume we have a different configuration than figure 1: The magnetic field points down the page (in the plane of the page) and a wire goes straight across the page, with current flowing from left to right. What is the direction of the force on the current carrying wire? [1 pt]
   a. towards the top of the page  d. to the left of the page
   b. towards the bottom of the page  e. into the page
   c. to the right of the page  f. out of the page

In part A, we will be finding the force on the current loop for various current values. We will plot magnetic force versus current (force = “y” and current = “x”) and draw a best fit straight line to our data. We will then use the results of the graph to find \( B \) (magnitude).

6. In part A (and also part B) what must you be careful NOT to do? [1 pt]
   a. touch the current loops to the magnets  d. Choices a, b, and c
   b. go above 5 Amp in current  e. Choices a and b
   c. use a current loop greater than 4.0 cm  f. None of these choices.

7. How do we find the magnitude of \( B \) (magnetic field) from the results of the graph? [2 pts]
   a. \( B = \text{slope} \)   d. \( B = \text{(slope)} I \)
   b. \( B = \text{(slope)} L \)  c. \( B = \text{(slope)}/I \)
   c. \( B = \text{(slope)}/L \)  f. \( B = \text{y-intercept} \)

In part B, we will be finding the force on the current loop for various length current loops. We will plot magnetic force versus length (force = “y” and length = “x”) and draw a best fit straight line to our data. We will then use the results of the graph to find \( B \) (magnitude).

8. How do we find the magnitude of \( B \) (magnetic field) from the results of the graph? [2 pts]
   a. \( B = \text{slope} \)   d. \( B = \text{(slope)} I \)
   b. \( B = \text{(slope)} L \)  c. \( B = \text{(slope)}/I \)
   c. \( B = \text{(slope)}/L \)  f. \( B = \text{y-intercept} \)