**Class\_\_\_\_\_\_ Student ID\_\_\_\_\_\_\_\_\_\_\_\_\_ Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Instructor\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pre-class Assignment Grade\_\_\_\_\_\_\_\_\_\_\_ Final Grade\_\_\_\_\_\_\_\_\_\_**

**Experiment：The Hall Effect**

**Ⅰ. Pre-Lab Preparation**

1. List the goals of the experiment.

2. Pre-class assignment 2: Describe the principle of the Hall Effect. Figure(s) can be drawn, but do not copy + paste from the Guide Book.

**II. Original Data**

1. **Measuring the sensitivity *K*H of the Hall sensor**

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| --- | --- | --- | --- | --- | --- |
| *I*H (mA) | *U*1 (mV) | *U*2 (mV) | *U*3 (mV) | *U*4 (mV) | *U*H = (|*U*1| + |*U*2| +|*U*3| +|*U*4|)/4  (mV) |
| +*I*M, +*I*H | -*I*M, +*I*H | +*I*M, -*I*H | -*I*M, -*I*H |
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1. **Measuring the UH -** **IM curve**

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| --- | --- | --- | --- | --- | --- | --- |
| *I*M (mA) | *U*1 (mV) | *U*2 (mV) | *U*3 (mV) | *U*4 (mV) | *U*H = (|*U*1| + |*U*2| +|*U*3| +|*U*4|)/4  (mV) | *B* (mT) |
| +*I*M, +*I*H | -*I*M, +*I*H | +*I*M, -*I*H | -*I*M, -*I*H |
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1. **Measuring the magnitude and distribution of the magnetic induction *B* in the electromagnet air gap**

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| --- | --- | --- | --- | --- | --- | --- |
| *x* (mm) | *U*1 (mV) | *U*2 (mV) | *U*3 (mV) | *U*4 (mV) | *U*H = (|*U*1| + |*U*2| +|*U*3| +|*U*4|)/4  (mV) | *B* (mT) |
| +*I*M, +*I*H | -*I*M, +*I*H | +*I*M, -*I*H | -*I*M, -*I*H |
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| Instructor’s Name |  |
| Signature |  |

**III. Analysis and Conclusion of Results**

1. Plot the *UH*-*IH* curve, use the least squares method to calculate the slope *K*1, and calculate the sensitivity *KH*1 of The Hall sensor;
2. Plot the *UH*-*IM* curve, use the least squares method to calculate the slope *K*2, and calculate the sensitivity *KH*2 of The Hall sensor;
3. Plot the *B*-*X* graph and describe the distribution characteristics of *B* in the *X* direction within the electromagnet’s air gap.

**IV. Questions**

1. How can the conductive type of the Hall plate (*N* or *P* type semiconductor) be determined based on the directions of *B*, *IH*, and *UH*, with illustrations required. (Note: In *N* type semiconductors, the carriers are electrons; in *P* type semiconductors, the carriers are considered positive ions);
2. Estimate the carrier concentration of the Hall plate used in this experiment.