

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science

6.007 – Electromagnetic Energy: From Motors to Lasers
Spring 2011

Lab 6: Extra Credit Lab

Email Yu by Sunday, May 8, 2011

Lab Sessions: Tuesday and Wednesday, May 10 and 11, 2010

Due: Friday, May 13, 2011

1 Introduction

The extra credit lab is a chance for you to demonstrate both the theoretical knowledge and the lab techniques that you have learned in the class. For this lab, you will write your own lab procedures, and then perform the lab and analyze your data. The extra credit lab is not mandatory. You are allowed to choose your own groups of up to three people and you can choose which lab session to attend, but you will be graded individually. **Please email your TA by the end of the day on Sunday, May 8**, regarding your group, the lab session you will attend, and the problem you will work on, so that lab supplies can be arranged accordingly.

For the extra credit lab, you will:

- Pick from one of the three extra credit problems below.
- Write a lab procedure to answer your chosen problem. You can use any of the supplies that were available during the labs.
- Perform the lab procedures that you have written.
- Analyze your data and draw conclusions.
- Have fun!

2 Extra Credit Questions

1. You are given a fan (a DC motor and propellor) with three different attachable propeller sizes. Determine the friction coefficients for the three different propeller sizes, and determine which of the three propellers provides the highest efficiency. (Guideline: stay under 4 W)

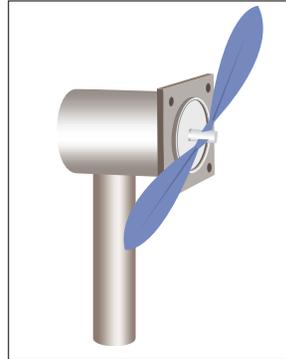


Image by MIT OpenCourseWare.

Figure 1: Let this fan cool you off in the lab!

2. You are given two vials of liquid containing differently colored dyes and two mystery vials containing a mix of the two with unknown ratios. Determine these ratios.

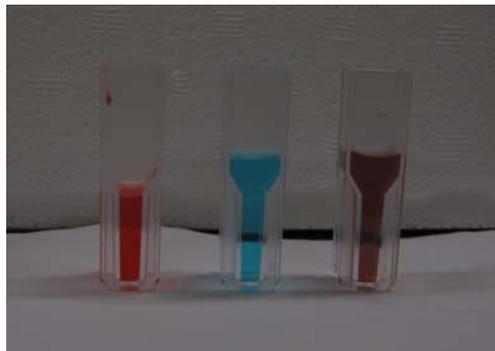


Figure 2: An example of red dye, blue dye, and a mystery mix

3. You are given a pair of Real D 3D glasses. Determine which eye has the right-handed circular filter, and which eye has the left-handed circular filter. You will have access to two waveplates (a half-wave plate and a quarter-wave plate) specified for 532 nm, but it's up to you to figure out which is which.



Figure 3: A pair of Real D 3D glasses. © D-Kuru/Wikimedia Commons. CC BY-SA. This content is excluded from our Creative Commons license. For more information, see <http://ocw.mit.edu/fairuse>.

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