ENG 142-E1   **Fundamental Engineering Design**   **Prof Jesson**

Lab # 3: LED Semiconductor Properties

This lab is to understand, graph, and simulate the non-linear properties of a LED and to leverage our knowledge of building circuits on breadboards, ohm's law, measuring I & V, and the simulation tool PSPICE.
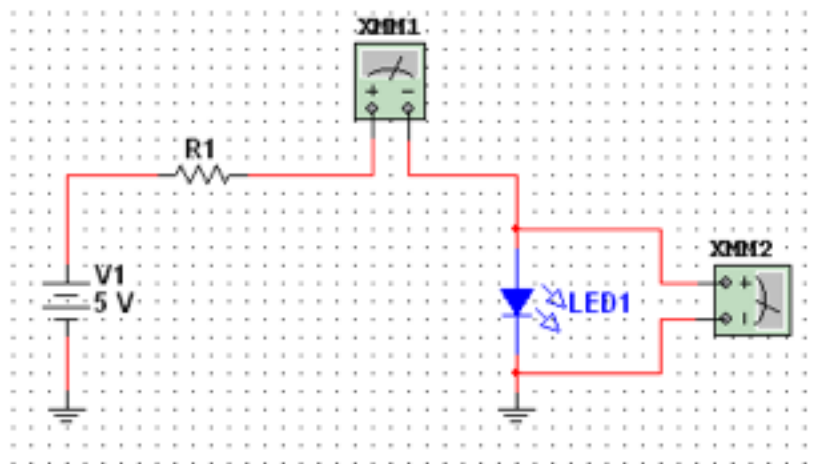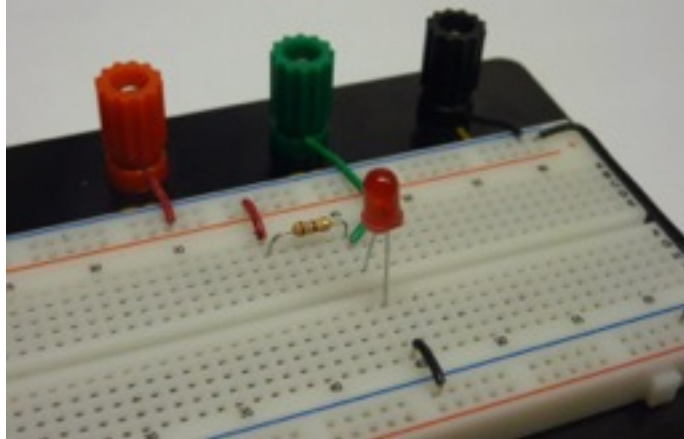

Figure 1. Initial Circuit Diagram

Using Figure 1, build the breadboard per the schematic shown, using two multimeters (use one from your kit to measure voltage). Use a 500 Ohm resistor for R1 and a variable power supply set to +5V. Complete Table 1.

Table 1. Measured Voltages and Current

Supply V1	R1 Color Band	Voltage **Vled**	Current **Iled**
5V	green, brown, brown, gold	1.7394V	

Modifying the Circuit in Figure 1, vary V1 from 1V to 10V, in steps of 0.500 V and complete Table 2:

Table 2. Measured Voltages and Current

Supply V1	R1 Color Band	Voltage **Vled**	Current **Iled**
1.00 V	510 Ohm GrBlBr	0.97425V	0.0002mA
1.50 V	510 Ohm GrBlBr	1.41040V	0.0373mA

2.00 V	510 Ohm GrBlBr	1.6351V	0.1023mA
2.50 V	510 Ohm GrBlBr	1.6745V	1.5530mA
3.00 V	510 Ohm GrBlBr	1.6932V	2.2070mA
3.50 V	510 Ohm GrBlBr	1.7054V	3.2780mA
4.00 V	510 Ohm GrBlBr	1.7216V	4.2057mA
4.50 V	510 Ohm GrBlBr	1.7301V	5.1280mA
5.00 V	510 Ohm GrBlBr	1.7394V	6.4685mA
5.50 V	510 Ohm GrBlBr	1.7462V	7.6285mA
6.00 V	510 Ohm GrBlBr	1.7560V	8.2084mA
6.50 V	510 Ohm GrBlBr	1.7650V	9.0744mA
7.00 V	510 Ohm GrBlBr	1.7711V	10.0122mA
7.50 V	510 Ohm GrBlBr	1.7770V	11.1318mA
8.00 V	510 Ohm GrBlBr	1.7860V	12.8000mA
8.50 V	510 Ohm GrBlBr	1.7900V	13.0771mA
9.00 V	510 Ohm GrBlBr	1.7970V	14.2150mA
9.50 V	510 Ohm GrBlBr	1.8033V	15.0000mA
10.00 V	510 Ohm GrBlBr	1.8101V	16.4621mA

1. Plot Vled & Iled from Table 2 using Matlab or Excel. What is your observations and conclusions about the LED from this graph? Expand from reading an LED specification sheet (attach or paste pages with photos)

2. Simulate and Document your results in PSPICE. Describe any similarities or differences between the breadboard design and your PSPICE Simulation (attach or paste pages with photos)