Name (*last, first*)_____ ID_____

ECE 2100

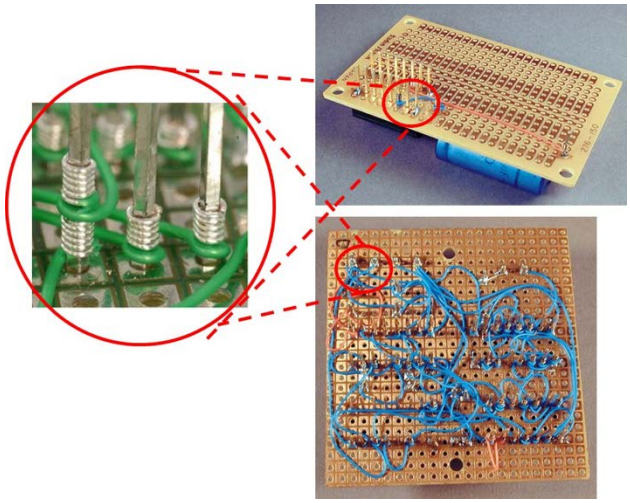
Lab. I – Electrical Measurements, Serial and Parallel Circuits

Pre-Lab

Important note: this is the pre-Lab of Lab I. You can type in the answers, or print out and write in the answers to the questions below and submit when it is due as indicated on the class schedule. To answer the questions, you need to go to the full Lab-I description web pages. 4 pts each question.

1. The breadboard (BB) that was distributed is ready to be used as is, without any need to do anything. True or False? Circle the correct response, explain your answer.

2. The holes on the BB are only for holding the legs of circuit elements, and to connect one circuit element to another, we need to wrap the wire on their legs together like the picture beside. True or False. Explain your answer.



3. All the holes belonging to a column of a breadboard (the holes running along the length of the board) are: (*circle your choice and explain*)
   a. Electrically connected together
   b. Electrically isolated from each other
   c. Electrically connected together for some columns and isolated for other columns

4. All the holes belonging to a five-hole row of a breadboard (the five holes running parallel to the width of the board) are: (*circle your choice*)
   a. Electrically connected together
   b. Electrically isolated from each other
   c. Electrically connected together for some rows and isolated for other rows

5. To get electrical power for the breadboard in the course, we use batteries or connect the binding post to the wall plugs. True or false?

6. What instrument do we use to get DC power for the breadboard?

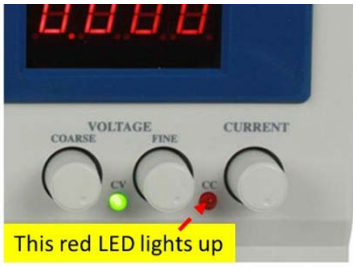
7. The BK Precision power supply that we will use for the course is designed to provide 120 V DC. True or false? Explain.

8. The BK Precision power supply that we will use for the course can: (*circle your choice*)
   a. Provide only one voltage source
   b. Provide two voltage sources
   c. Provide three voltage sources
   d. Provide any number of voltage source needed as long as it is below 30 V.

9. The BK Precision power supply that we will use for the course gives: (*circle your choice*)
   a. Output voltages in the front
   b. Output voltages in the back
   c. Neither front nor back because it is wireless.

10. Suppose you set the BK Precision power supply to provide 5 Volts. You use a wire with a resistance R =1 mΩ to short it ("short" means to connect the two output terminals with a zero- or near-zero resistance conductor such as a wire). Can it provide the current according to Ohm's law? Explain.

11. Suppose you set the BK Precision power supply to provide 10 Volts. You connect the output to the breadboard; suddenly the output voltage indicator drops to less than 1 V and the current knob LED indicator lights up. What do you think happens, why, and what you should do ASAP.



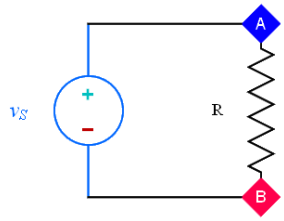
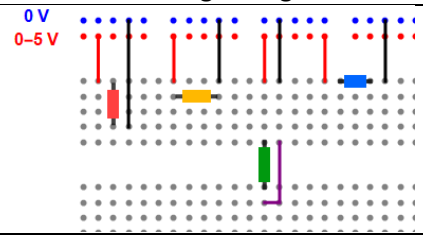
12. In this lab course, what instrument will you use to measure DC voltage, current, resistance, and capacitance?

13. One can buy a very inexpensive instrument to measure voltage, current, etc. such as the one shown on the right (~ $6.00). Can we use it to report measurements in this course? Explain your answer.

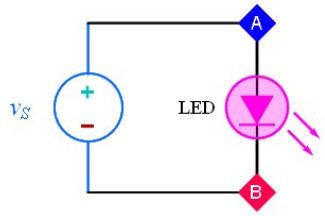
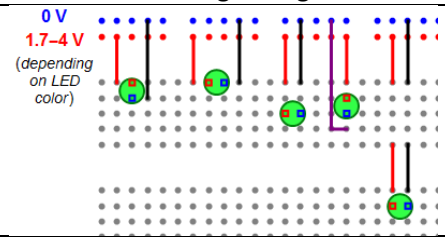
14. Suppose you set the output voltage of the BK power supply to 5.000 V. You measure the voltage with the Keysight/Agilent 34405a and obtain 4.9371 V. Explain what you think and which figure you will use in your lab report.

15. When you use a resistor for lab work. It is good enough to use the resistance value based on the color-band code for the lab report. True or false? Explain.

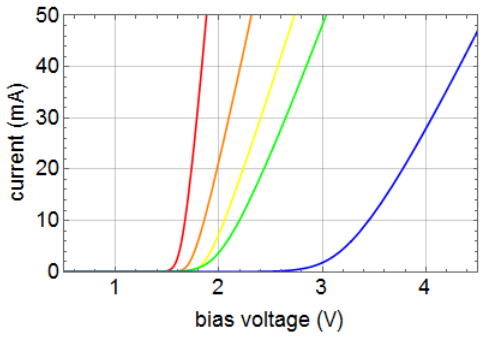
16. Circle all the wiring(s) on the right what you think as correct representation of the circuit on the left.

Schematic	Breadboard wiring configuration
	

17. What is the biggest "wrong" with the breadboard wiring on the right? If you build the whole thing as shown, and connect to the BK power supply, what do you think will happen? (hint: see Q. 11 above). Explain what you will do, and circle all the wiring(s) on the right what you think as correct representation of the circuit on the left (if correct, the LED will light up).

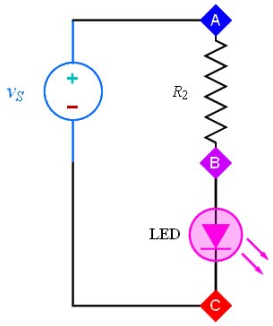
Schematic	Breadboard wiring configuration
	

18. According to the graph beside, if you use the same voltage on a red and a green LED, you should get exactly the same current. True or false? Explain.



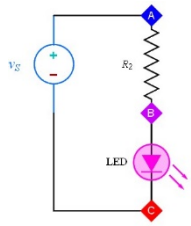
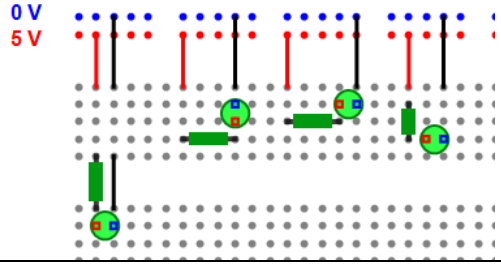
19. According to the graph beside, if you want 25 mA for a red and a green LED: (*circle all correct choices*).
    a. The voltage of the red LED should be higher than that of the green.
    b. The voltage of the green should be higher than that of the red.
    c. The voltages of both the red and green LED should be equal.
    d. The voltage for the green should be ~2.5 V and that of the red is ~1.8 V

20. Use the given app (or if you wish, you can do calculation on your own) to obtain an estimate for the expected current of this resistor-LED circuit (v_S=5V)



    a. LED: red, R=120 Ω. (*write your answer here->*)
    b. LED: yellow, R=110 Ω.
    c. LED: green, R=85 Ω.
    d. LED: blue, R=50 Ω.

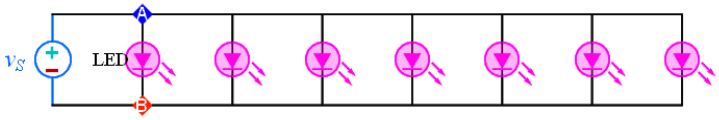
21. Circle all the wiring(s) on the right what you think as correct representation of the circuit on the left (if correct, the LED will light up).

Schematic	Breadboard wiring configuration
	

22. The electrical wiring for household is:
    a. parallel
    b. serial

23. For the same set of electrical power-consuming devices, the supply circuit current when they are serially connected is lower than that when they are parallelly connected. True or false.

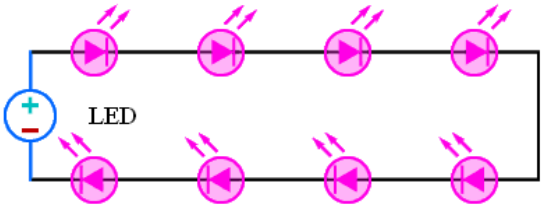
24. Consider this circuit.
    a. If one LED is broken open, will other LEDs remain lighted up or go dark?



    b. If one LED is shorted, will other LEDs remain light up or go dark?

25. Consider this circuit.
    a. If one LED is broken open, will other LEDs remain lighted up or go dark?

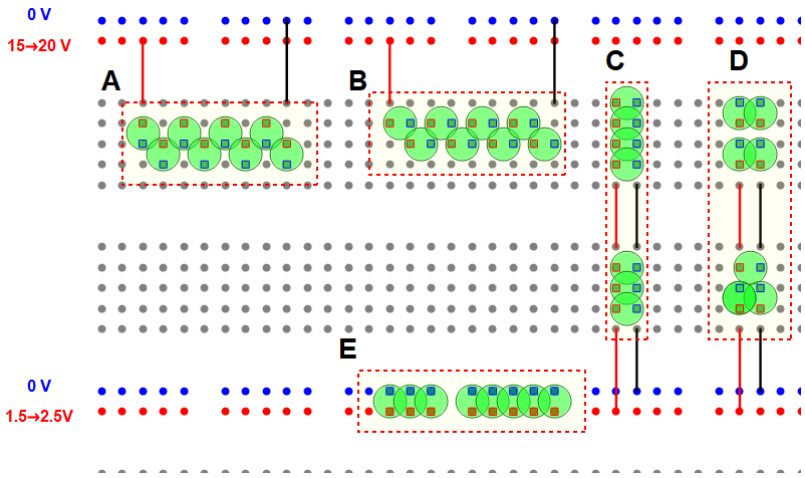
    b. If one LED is shorted, will other LEDs remain lighted up or go dark?



26. Consider this breadboard wiring: circle all circuits that will work as serial circuit.

27. Consider this breadboard wiring: circle all circuits that will work as parallel circuit.

28. *Leave this question unanswered until you see the demo in the lab. Then fill in the answer and turn in to the TA*



While the BK power supply can work as a current source, it works only when the current is sufficiently large, ~ few 100's mA. If so, if you want to control the current supply to a circuit, such as a circuit on the breadboard above, what do you think you can do? (see class demo first).