University of Jordan
School of Engineering
Electrical Engineering Department

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EE 204
Electrical Engineering Lab

EXPERIMENT 1 REPORT
MEASUREMENT DEVICES

Section # _____ **Group #** _____

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EXPERIMENT 1
MEASUREMENT DEVICES

PROCEDURE A – CONNECTING YOUR CIRCUIT

1. List the name of each device currently on your bench and count the number of such devices. For example, 1 oscilloscope, 4 multimeters, etc.

One breadboard, one power supply, ~~one~~ two multimeters, one function generator & ~~one~~ two oscilloscope

5. Write one paragraph explaining the function of a breadboard.

Breadboard usually used to build a prototype of an electrical circuit, without the need for soldering, usually for quick temporary testing. Every five horizantal holes work as one node and the two columns on both sides known as bus strips use to carry the power rails, also breadboard could provide voltage or get it from power supply.

6. Write one paragraph explaining the function of a DC power supply.

DC power supply used to generate a constant DC voltage which controlled by "voltage" knobs and the current can be limited by adjusting the "current" knobs to avoid damaging the electrical components in the circuit.

7. Use a Voltmeter to measure the voltage across *R*, and record it below. Remember to select the V button with a suitable range (depending on the screen reading), and to connect the voltmeter to the resistor using two suitable leads, the positive lead should be inserted in the V/Ω terminal and the negative lead should be connected to the COM terminal. In DC measurements select the DC option, and **pay attention** to the polarity when connecting your voltmeter.

$V_{measured} = 7.92$

8. Did you connect the Voltmeter in series or parallel with the resistor *R*?

Parallel

9. Calculate the expected current in the resistor *R* and the LED using Ohm's law? Show your equation.

$I = \frac{V}{R} = \frac{7.92}{470}$ $I_{expected} = 16.85\ mA$

10. Now use an Ammeter to measure the **current** in the LED, and record it below. Remember to select the DCA button with a suitable range (depending on the screen reading), and to connect the ammeter using two suitable leads, the positive lead should be inserted in the 2A or 20A terminal and the negative lead should be connected to the COM terminal. In DC measurements, select the DC option, and **pay attention** to the polarity when connecting your ammeter.

$I_{measured} = 16.48mA$

11. Did you connect the Ammeter in series or parallel with the LED?

In Series

12. Are the theoretical and measured values for the current in the LED close or far apart?

Close, the different is just 370μA.

13. Now use an Ohmmeter to measure the actual **resistance** value for *R*, and record it below. Remember to select the Ω button with a suitable range (depending on the screen reading), and to connect the ohmmeter to the resistor using two suitable leads, one lead should be inserted in the V/Ω terminal and the other lead should be connected to the COM terminal. Make sure you disconnect the resistor *R* from the circuit and move it somewhere else to measure its resistance.

$R_{measured} = 478.9\Omega$

14. Explain why you should disconnect *R* from the circuit when measuring its resistance using an Ohmmeter.

Because an extra current from other resources can damage the Ohmmeter and can also affect the overall Thevenin resistance the Ohmmeter measure.

15. Is the actual resistance value for *R* exactly the same as its nominal value? Or slightly different?

It is slightly different

16. Now re-calculate using Ohm's law the expected current in the resistor *R* using its actual value (rather than its nominal value) and the value of the voltage across the resistor. Record this value below.

$I = \frac{V}{R_{measured}} = \frac{7.92}{478.9} = 16.54\,mA$

17. Is the new current value close to the ammeter reading you had earlier in part 10?

Yes it is

PROCEDURE B - ON/OFF AND REFRESH RATE

1. In the above circuit, replace the DC power supply Vs with a function generator that produces an 8 Vpk-to-pk and 100 Hz square wave signal. Which knobs did you fiddle with for the function generator?

1. Amplitude knob
2. Frequency knob

2. Connect the oscilloscope in parallel with the function generator and observe the signal on the oscilloscope. Explain how do you read the period, frequency, peak-to-peak voltage and peak voltage from the oscilloscope screen?

According to divided screen of the oscilloscope it is noticeable that it has 8 squares on the vertical axis (voltage) and 10 squares on the horizantal axis (time), so we take period reading from x-axis (time per division) the time needed for whole signal. The frequancy is the number of signal in one second (Hz). Peak to peak voltage read from y-axis (the distance between Peak and bottom vertically). Finally peak voltage is the distance between x-axis and the peak of signal. In all measurments we should take in consider the scale and value for each diviision on the screen.

3. Does the LED flicker at 100 Hz?

NO

4. Change the frequency of the function generator from 100 Hz slowly to 5 Hz? At which frequency did the LED start flickering?

Around 40 Hz

5. Search the Web for the refresh rate for a typical computer screen? Write it below. Why do you think they use this frequency?

60 Hz, the higher the refresh rate, the less image flicker you will notice on the screen.

6. Reduce the peak-to-peak voltage from the function generator. How do you do that?

Using amplitude knob

7. What happens to the light from the LED as you decreased the voltage?

The intensity of illumination decreased.

8. Read the input impedance of your oscilloscope and record it below? Why is it high?

(.....), to have no significantly effect on the input signal when connected in Paralled with the circuit.