

Assignment 1 (15%)
Experiment I: Electrical Measurement

Objectives:

1. To perform current and voltage measurements using electrical and electronics instruments.
2. To perform resistance measurement using Wheastone's bridge.

Apparatus:

Digital Multimeter
Analog Multimeter
Wires
Solderless board
Power Supply / 9V battery
Resistors: 100 Ω , 150 Ω , two 330 Ω , 1 k Ω and 39 k Ω .
Potentiometer

Part A: Voltage and Current Measurement

Procedures:

1. Connect the circuit as shown in Figure 1 by using the provided apparatus.

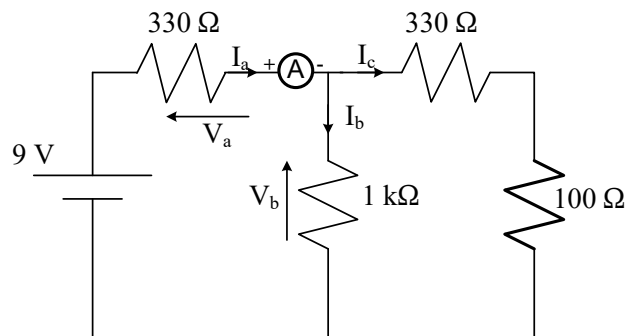


Figure 1: Circuit diagram

2. Using Kirchhoff's circuit laws, calculate I_a , I_b , I_c , V_a and V_b of Figure 1.
3. Use appropriate electrical instruments to measure I_a , I_b , I_c , V_a and V_b .
4. Complete the table below for all the parameters.

| Parameters | Calculation (Attached Working Steps) | Measurement 1 (Analog Instruments) | Measurement 2 (Digital Instruments) |
|------------|---|---------------------------------------|--|
| I_a (mA) | | | |
| I_b (mA) | | | |
| I_c (mA) | | | |
| V_a (V) | | | |
| V_b (V) | | | |

5. Compare and conclude the values of the obtained parameters.
6. Discuss your experiences and observation while using the multimeters for electrical measurements.

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Part B: Resistance Measurements - Wheatstone's Bridge

Procedures:

1. Measure the value of the potentiometer using digital multimeter. Write down your observation when you turn the knob of the potentiometer and write down the min and max value of the potentiometer.

| $R_{\text{pot,min}}$ | $R_{\text{pot,max}}$ |
|----------------------|----------------------|
| | |

2. Connect circuit as shown in Figure 2.

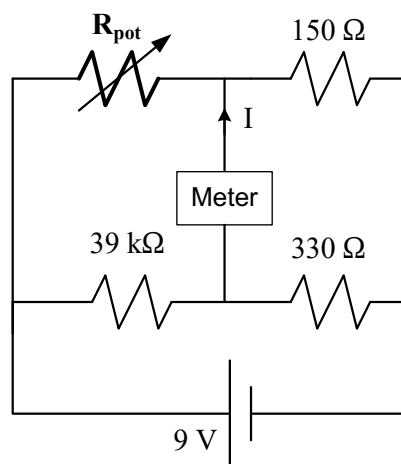


Figure 2: Wheatstone's Bridge

3. Calculate the value of the potentiometer when the bridge is balanced.
4. Turn the knob of the potentiometer that make the bridge in balance condition. Measure the value of the potentiometer and record it as $R_{\text{pot,balanced}}$.
5. Write down your observation and discussion for step 3 and step 4.

Reflections, Report and Video:

1. Reflection is to be submitted individually regarding their experiences and feedback about the laboratory session (through elearning, eportfolio or depending on each section).
2. Report should consist of introduction, experimental procedures, circuits, data collection, results, and discussions dan finally conclusion.
3. You are required to produce a short video (maximum 2 minutes) about this experiment that should show the group members details, overall experiment processes, results, and findings of the laboratory work.

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Assessment Rubrics:

| PLO | Criteria | 4 | 3 | 2 | 1 | 0 | Weight | Subtotal |
|----------|--|---|--|--|--|--|---------------|----------|
| 2 | Ability to perform experiment | Connect circuit correctly independently | Able to connect circuit with very little help from the instructor | Able to connect circuit with some help from the instructor | Require help to connect circuit for the experiment | Unable to connect circuit and have no knowledge on basic components. | × 0.75 | /3 |
| | Measurement and Data Collection | Able to make measurement and collect data correctly. | Able to make measurement with little help from instructor | Able to make measurement with some help from the instructor | Require help to make measurement | Failed to acquire measurement data after help has been provided | × 0.5 | /2 |
| 4 | Able to use equipment and instruments appropriately | Able to use and connect instrument to perform measurement correctly and independently. | Able to use and connect instrument to perform measurement correctly however with little help from instructor. | Able to use and connect instrument to perform measurement however require some help from instructor. | Able to connect and identify instrument to acquire data after providing help. | Unable to connect and perform measurement even after providing help in experiment setup. | × 1.25 | /5 |
| 6 | Reflection | Submission of reflection showing related information on the studied content | - | - | Submission of reflection but not showing related information on the studied content | No Submission | × 0.25 | /1 |
| | Technical Report | Content of the report cover intensively the introduction, procedures, measurement, results, and discussion. The writing is free from major errors. | Content of the report cover some introduction but procedures, measurement, results, and discussion is incomplete. The writing has minor error. | Content of the report do not have introduction, and the procedures, measurement, results, and discussion or incomplete or missing. The writing has minor error. | Content of the report is incomplete, procedures, results and discussions are incomplete. The report is full of errors. | Technical Report not submitted. | × 0.75 | /3 |
| | Video | Content of the video is complete with information on the experiment and data acquirement. Video resolution and audio is clear and good. | Content of the video is almost complete with some information on the experiment and data acquirement. Video resolution and audio is acceptable. | Content of the video is incomplete. Information on the experiment and data acquirement is missing. Video resolution is acceptable, and some audio is unclear. | Content of the video is incomplete and no relevant information on the experiment and data acquirement. Video resolution is not acceptable, and some audio is unclear. | No video submission. | × 0.25 | /1 |
| | | | | | | | TOTAL: | /15 |