Title: **Internal Resistance** Lab: 19

Course: Electrical Applications Unit: Electrical Lab CLO: 2, 3, 4

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Grade \_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall measure the voltage of a known bad battery and compare quantities against a known good battery.
2. Student shall calculate the efficiency of a battery.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Lab. Grading shall be based on instructor evaluation.

**Materials**

|  |  |
| --- | --- |
| Student Provided Materials | Department Provided |
| Proto board | Two 9V batteries |
| Multimeter |  |
| Resistor Kit |  |
| Calculator |  |

**Theory**

Every power source has some sort of internal resistance that must be overcome before any power can be delivered to the power sources load. A new battery will have low internal resistance and therefore be able to supply an effective amount of power. Over time, the internal resistance will increase with usage as the batteries chemical process degrades. The internal resistance affects the amount of current the battery can output and hence the power supplied will be lower. Under very small loads, the internal resistance is difficult to detect. That is why measuring a 9V battery that has a higher internal resistance with a 10MΩ multimeter will still indicate the battery’s potential is 9V. If that same battery had a load during voltage measurement, the battery’s potentials would be much less. Below is a formula to calculate a sources efficiency based on internal resistance.

|  |  |
| --- | --- |
|  |  |

**Instructions**

Measurements

1. Take the two batteries supplied by your instructor and label them Battery 1 and   
   Battery 2.
2. Measure and record below the no-load voltage of each.

Battery1 \_\_\_\_\_\_\_\_\_\_ Battery 2 \_\_\_\_\_\_\_\_\_\_

1. Build the simple circuit below on your proto board.



Where;

1. For each battery in the circuit, measure and record the voltage and current. Calculate the power and internal resistance using voltage and current.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | P | I | RINT | E |
| B1 |  |  |  |  |
| B2 |  |  |  |  |

Calculations

1. Using the formula on the previous page, calculate each batteries efficiency.

Battery1 \_\_\_\_\_\_\_\_\_\_ Battery 2 \_\_\_\_\_\_\_\_\_\_

Evaluations

1. Which battery had the higher current output?
   1. Battery 1
   2. Battery 2
2. Which battery had the higher internal resistance?
   1. Battery 1
   2. Battery 2
3. Which battery had the higher efficiency rating?
   1. Battery 1
   2. Battery 2
4. Based on your answers above, which battery would be considered “good”?
   1. Battery 1
   2. Battery 2