



Daffodil International University (DIU)

Department of Electrical and Electronic Engineering

EEE 422: Measurement and Instrumentation Lab

EXPERIMENT NO: 01

NAME OF THE EXPERIMENT: HIGH RESISTANCE MEASUREMENT BY LOSS OF CHARGE METHOD.

Objective & Theory:

To study the principle of measuring unknown resistance by Loss of charge method.

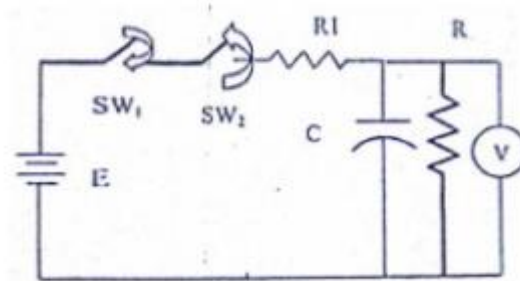


Fig. 1: Experimental Circuit

In the loss of charge method unknown resistance is connected in parallel with the capacitor and electrostatic voltmeter. The capacitor is initially charged to some suitable voltage by means of a battery of voltage V and then allowed to discharge through the resistance. The terminal voltage is observed during discharge and it is given by,

$$V = E e^{-\frac{t}{RC}}$$

List of Equipment:

1. Resistances (1M, 100k)
2. Capacitor (4.7uF, 47uF, 2.2uF)
3. Wire
4. Trainer board
5. DC supply

Procedure:

Charge a capacitor in parallel with the resistance under measurement with a dc voltage by pressing the switch SW1. Wait until the capacitor voltage comes to a steady state value. Turn OFF the switch SW2 at t=0 and record the voltage across the capacitor at an interval of 1 second.

The voltage across the capacitor is given by

$$V = E (1 - e^{-t/RC})$$

Or, $R = t / (C \ln (E/V))$

Step 1. Choose C=2.2uF, R=1M, R1=100k. Record V (n) for n=1, 2, 3,....., 10 seconds.

Step 2. Repeat step 1 for C=4.7uF.

Step 3. Repeat step 1 for C=47uF.

Tabulate the recording for steps 1, 2, 3. Determine the unknown resistance.

Data Table (Ex 02)

Capacitance C	Time t	Voltage V	Resistance, $R = \frac{\Delta t}{C \log(E/V)}$

Report:

1. What is time constant?
2. Explain the effect of the value of capacitance chosen for the experiment.
3. Is this process feasible for measurement of low resistance? If not, why?
4. What is the leakage resistance of the capacitor? What is its effect?