



Daffodil International University (DIU)

Department of Electrical and Electronic Engineering

EEE 422: Measurement and Instrumentation Lab

EXPERIMENT NO: 02

NAME OF THE EXPERIMENT: RESISTANCE MEASUREMENT BY WHEATSTONE BRIDGE.

Objective:

- To study the principle of measuring unknown resistance by Wheatstone Bridge
- To determine bridge sensitivity

Theory:

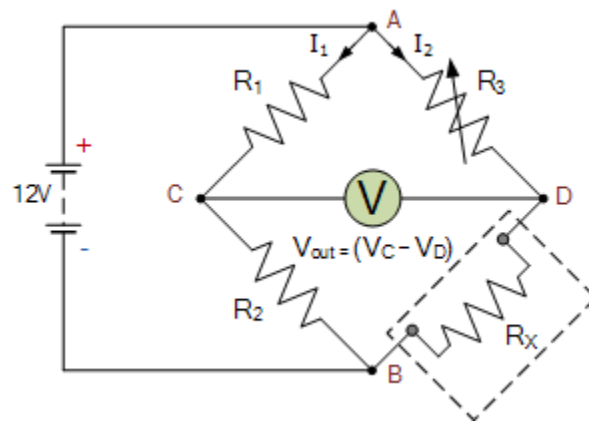


Fig. 1: Experimental Setup

By placing a resistance of known or unknown value in the sensing arm of the Wheatstone bridge corresponding to R_x and adjusting the opposing resistor, R_3 to “balance” the bridge network, will result in a zero voltage output. Then we can see that balance occurs when:

$$\frac{R_1}{R_2} = \frac{R_3}{R_x}$$

Sensitivity Calculation:

$$S_B = \frac{S_V \times E}{\frac{R_3}{R_x} + 2 + \frac{R_x}{R_3}}$$

Here, $S_v = 0.01$, $E =$ Applied voltage

List of Equipment:

1. Resistances (1k to 10k)
2. Potentiometer (10k)
3. Wire
4. Trainer board
5. DC supply

Procedure:

1. Set $R_1/R_2=2$. Add Unknown resistance R_x . Record Galvanometer readings for different R_3 until the V_{CD} is zero.
2. Take 3 more readings using the potentiometer (R_3).
3. Repeat step 1 and 2 for $R_1/R_2=0.5$.
4. Repeat step 1 and 2 for $R_1/R_2=1$

Tabulate the recording for steps 1, 2, 3& 4 and calculate the bridge sensitivity. Also find the average value of sensitivity for each case.

Data Table:

R_1/R_2	V_{CD} (V)	R_3 (k Ω)	R_x (k Ω)	R_3/R_x	Sensitivity (S_B)
2	i)	i)		i)	i)
	ii)	ii)		ii)	ii)
	iii)	iii)		iii)	iii)
	iv)	iv)		iv)	iv)
	v)	v)		v)	v)
	vi)	vi)		vi)	vi)
	vii)	vii)		vii)	vii)
0.5	i)	i)		i)	i)
	ii)	ii)		ii)	ii)
	iii)	iii)		iii)	iii)
	iv)	iv)		iv)	iv)
	v)	v)		v)	v)
	vi)	vi)		vi)	vi)
	vii)	vii)		vii)	vii)
1	i)	i)		i)	i)
	ii)	ii)		ii)	ii)
	iii)	iii)		iii)	iii)
	iv)	iv)		iv)	iv)
	v)	v)		v)	v)
	vi)	vi)		vi)	vi)
	vii)	vii)		vii)	vii)

Questions:

1. Explain the advantages of the Wheatstone bridge method of measuring resistance.
2. Distinguish between null type and deflection type instrument.
3. Derive the equilibrium condition of Wheatstone bridge using Kirchhoff's Laws.