

Bangladesh University of Engineering and Technology
Department of Electrical and Electronic Technology

EEE 428

Measurement and Instrumentation Laboratory

Experiment 1

Resistance Measurement by Wheatstone Bridge

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Measurement and Instrumentation Laboratory

EEE 428

Experiment No :01

Experiment Title : Resistance Measurement by Wheatstone Bridge

Objective of the experiment

The objective of the experiment is to understand the application of Wheatstone Bridge, by determining an unknown resistance using the Wheatstone bridge. The objectives further include determining bridge sensitivity and other features of the Wheatstone bridge.

Experimental Setup:

The following circuit was implemented in Tinkercad for the experimentation.

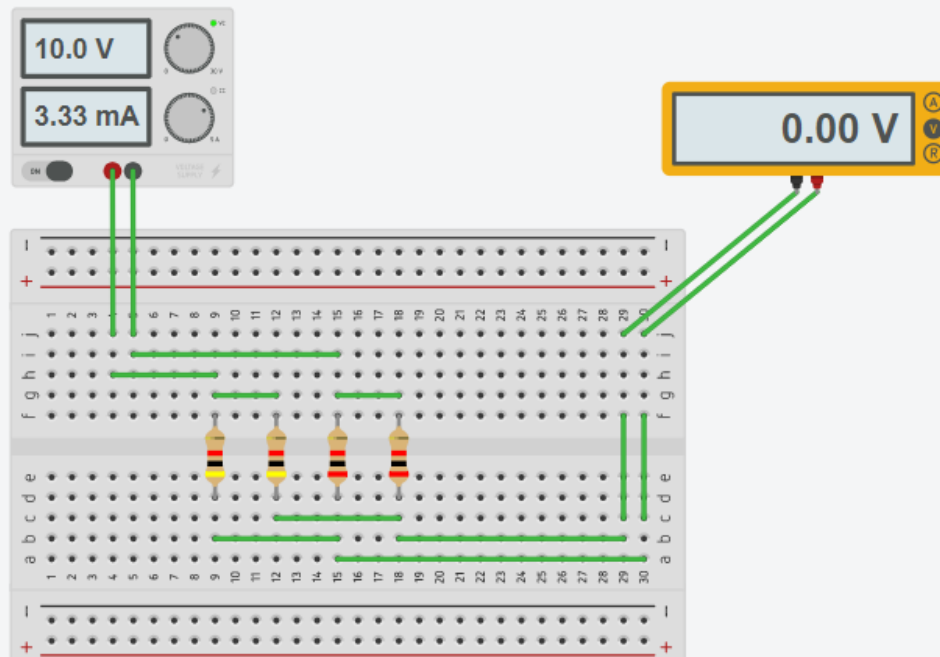


Figure 1 Tinkercad Implementation

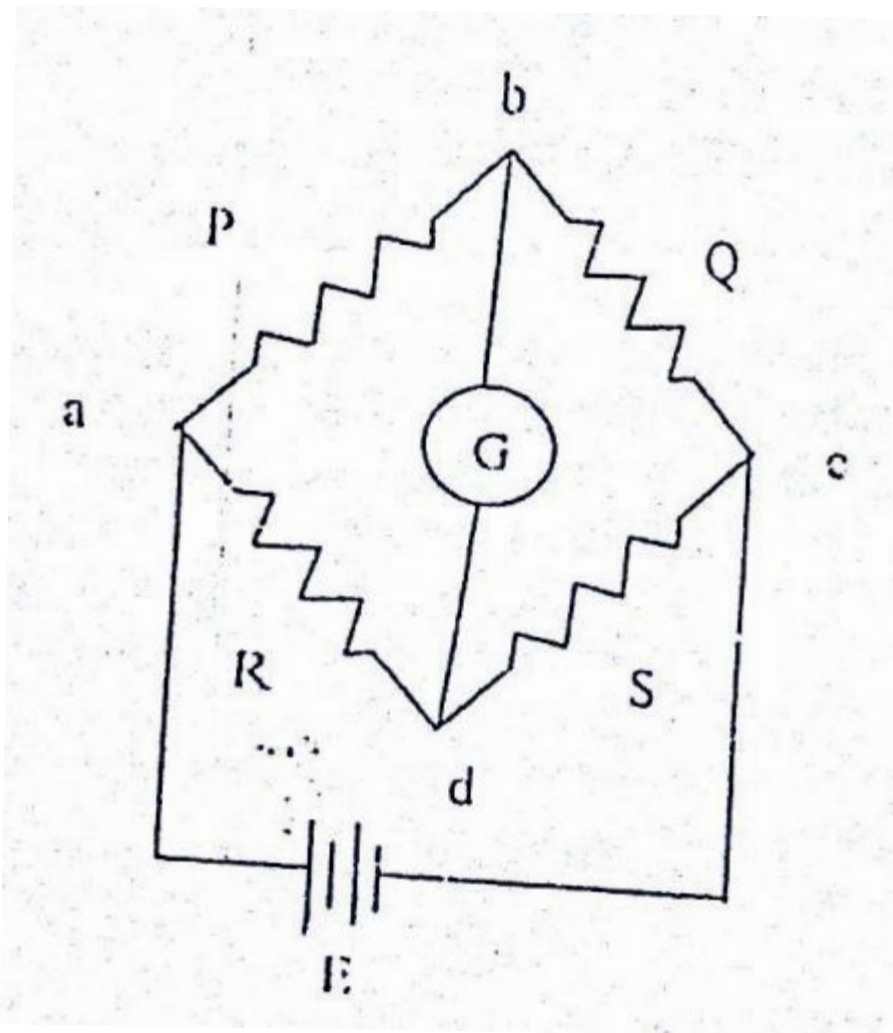


Figure 2 Schematic diagram

For step-1, as $P/Q = 2$; $P=4k\Omega$ and $Q=2k\Omega$ was selected.

For Step 2, as $P/Q=0.5$; $P=4k\Omega$ and $Q=8k\Omega$ was selected.

For Step 3, as $P/Q=1$; $P=4k\Omega$ and $Q=4k\Omega$ was selected.

For all these cases, R was an unknown resistance and the value of S was changed until the galvanometer showed zero deflection.

Experimental Data:

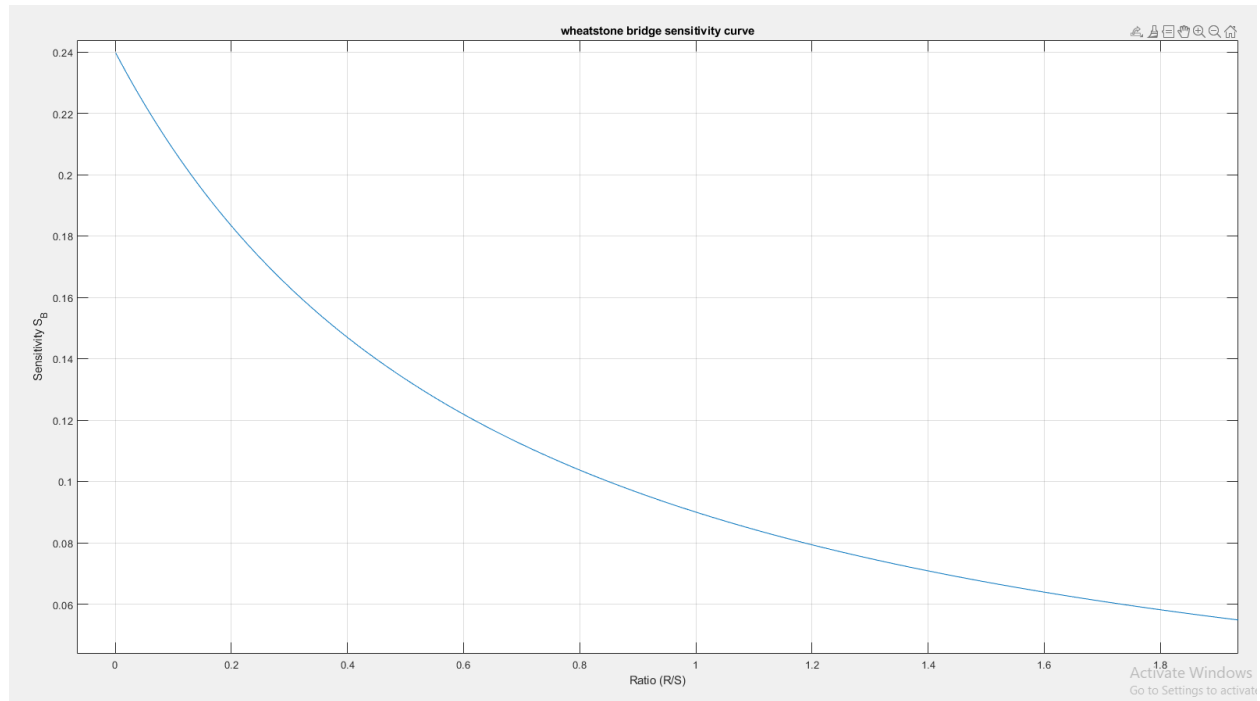
Step 1:

P(Kohm)	Q(Kohm)	P/Q	unknown resistance R (Kohm)	S	R/S	Galvanometer V_{bd} (Volt)
4	2	2	2	3.3	0.6	-2.89
				2	1	-1.67
				1	2	0
4	8	0.5	2	2	1	1.33
				3.3	0.6	0.41
				4	0.5	0
4	4	1	2	4	0.5	-1.67
				3.8	0.526	-1.54
				2	1	0

Simulation Code :

```
1 %EEE 428 expl
2 - clear all
3 - close all
4 - clc
5 - E=12;
6 - Sv=0.01;
7 - delta=0.001;
8 - for n=1:2000
9 -     R_S(n)=n*delta;
10 -    SB(n)=Sv*E/ (R_S(n)+1/ (R_S(n)+2) );
11 - end
12 - plot(R_S,SB);
13 - grid on
14 - title('wheatstone bridge sensitivity curve')
15 - xlabel('Ratio (R/S)')
16 - ylabel('Sensitivity S_B')
```

Simulation Output:



Conclusion :

The experiment demonstrates the viability of using the Wheatstone bridge configuration for determining unknown resistance. It can be further concluded that the sensitivity of the system decreases as the ratio of R and the unknown resistance increases.