12.WHEATSTONE'S BRIDGE

Objective:

To determine the unknown value of resistance using wheatstone's bridge.

Apparatus:

Software: Lab view software.

Hardware:

Name of the apparatus	Quantity
Bread board	1 No
Resistors	3 No
Variable Resistor	1 No
Digital Multimeter	1 No

Theory :

The bridge consists of four resistive arms together with a source of e.m.f. and null detector. The galvanometer is used as a null detector. When the bridge is balanced, the galvanometer carries zero current and it does not show any deflection. Thus bridge works on the principle of null deflection or null indication.

To have zero current through galvanometer, the points B and D must be at the same potential. Thus potential across arm AB must be same as the potential across arm AD.

Thus $I_1R_1 = I_2 R_4$

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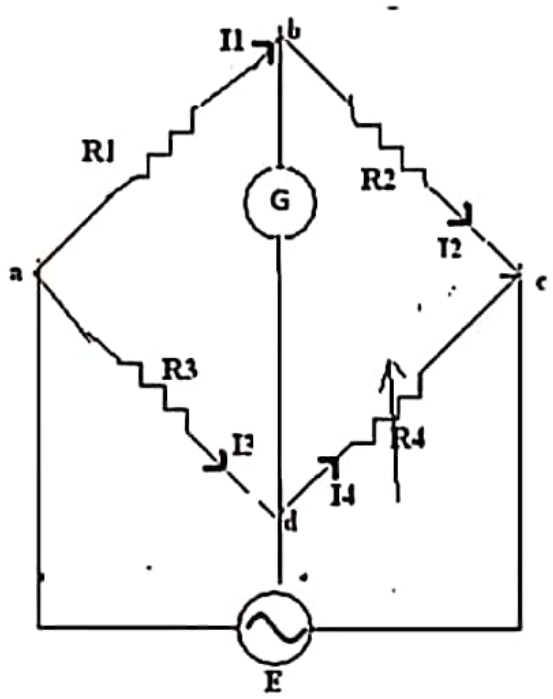

As galvanometer current is zero,

$I_1 = I_3$ and $I_2 = I_4$

Considering the battery path under balanced condition,

$I_1 = I_3 = E/(R_1+R_2)$

And $I_2 = I_4 = E/(R_3+R_4)$

Therefore $R_1(R_3+R_4) = R_4(R_1+R_2)$

$$R_1 = R_2R_4/R_3$$

Procedure:

1. Connect the circuit as shown in the figure.
2. Select any value of R_1.
3. Connect the multimeter between ground and output of imbalance amplifier.
4. Vary R_3, from minimum position, in clockwise direction.
5. If the selection of R_1 is correct the balance point can be obtained at minimum position.
6. If that is not the case, select another R_1.
7. Calculate the Resistance R_1 by substituting known values.

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Observation:

S.No	R_1	R_2	R_3	R_4

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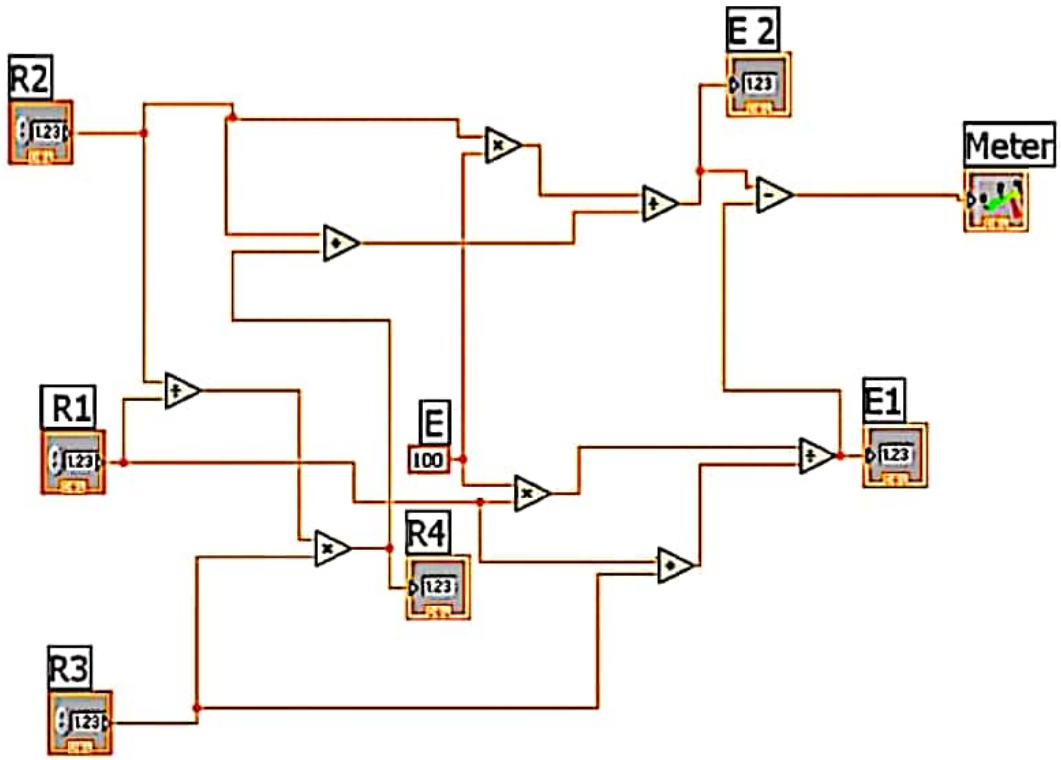
Block Diagram in Labview:



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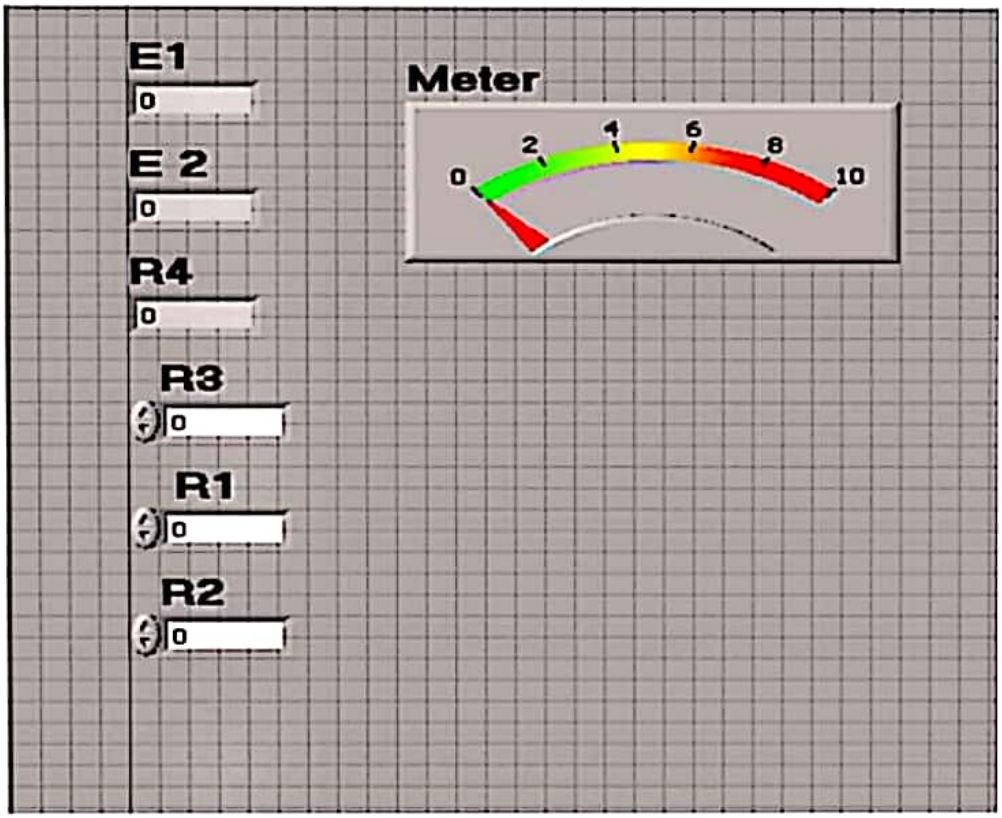
Front Panel in Labview:



Result:

Hence the balanced condition of wheatstone's bridge is obtained and unknown values of resistances are found.

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