Experiment No.- 9

**Title:** AC Bridge.

**Aim:**

(i) To measure the resistance and inductance using Anderson's bridge.

**Apparatus required:**

| Sl. No. | Name of component/apparatus | Specification | Quantity |
|---------|-----------------------------|---------------|----------|
| 1 | Anderson's bridge Trainer | | |
| 2 | Wien bridge Trainer | | |
| 3 | Capacitor | | |
| 4 | Inductor | | |
| 5 | Resistor | | |
| 6 | Variable resistance | | |
| 7 | Multimeter | | |

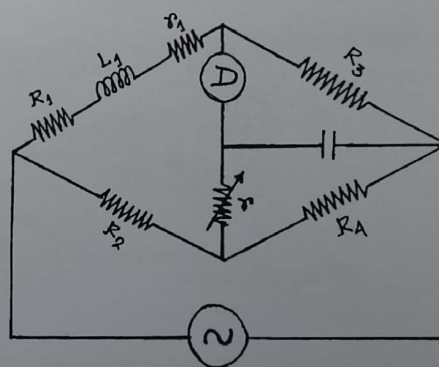**Theory:**

**Procedure:**



Fig: Anderson's Bridge

1. **Anderson's bridge:**
   a. Connect the trainer circuit to form an Anderson's bridge.
   b. Adjust the value of resistance to get a null.
   c. Calculate the value of the resistance and inductance.

**Observation:**

**(a) Anderson's bridge:**

| Sl. No. | Value of r | Value of r | $L = C \dfrac{R_3}{R_4}\left(r\left(R_2 + R_4\right) + R_2 R_4\right)$ |
|---|---|---|---|
|  |  |  |  |

**Result:**
**Precautions:**
**Conclusion:**

**Project:** To design and fabricate a suitable AC bridge and measure relevant parameters

Experiment No: 10

**Title:** DC Bridge.

**Aim:**

I) DC POTENTIOMETER & CALIBRATION OF AMMETER.

**Apparatus required:**

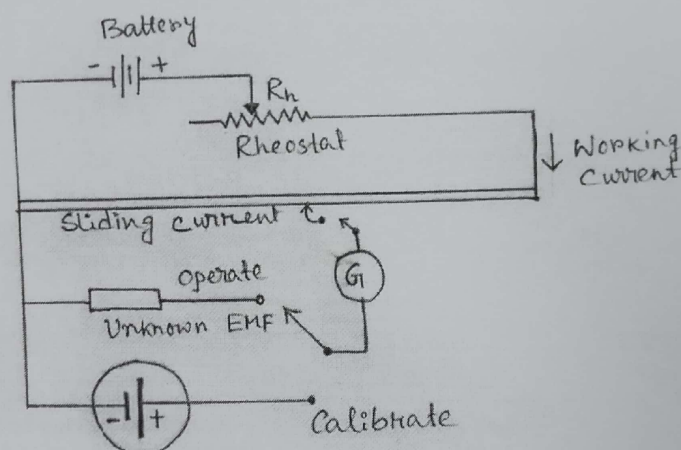| Sl. No | Name of equipments | Specification | Quantity |
|---|---|---|---|
|  |  |  |  |
|  |  |  |  |

**DC potentiometer:**



Fig: DC potentiometer circuit

**PROCEDURE:**

DC potentiometer:
(1) Connect emf (standard) to dc potentiometer.
(2) Adjust the dial to the known value of emf.
(3) Vary $P_1$ and $P_2$ until Galvanometer shows null.
(4) Compare the result with multimeter.

Observation table:

| RANGE SELECT | DIAL READING | LEAST COUNT(mV) | VOLTAGE MEASURED BY POTENTIOMETER |
|---|---|---|---|
|  |  |  |  |
|  |  |  |  |

**RESULT:**

**PRECAUTIONS:**

**CONCLUSION:**

## Experiment No: 11

**Title:** Measurement of earth resistance and insulation resistance.

**Aim:**

1) To measure earth resistance.

2) To measure the insulation resistance of different electrical machines.

**Apparatus required:**

| SL. No. | Name of the Equipment | Specification | Quantity |
|---------|----------------------|---------------|----------|
| 1 | Earth tester | | |
| 2 | Auxiliary electrodes | | |
| 3 | Connecting wires | | |
| 4 | Megger | | |

**Theory:**

**Procedure:**

A) **Measurement of earth resistance:**
   1) Connect "E" terminal of earth tester to earth electrode.
   2) Insert auxiliary electrode at specified distance.
   3) Connect "C" and "P" terminal to auxiliary electrode.
   4) Measure earth resistance.
   5) Vary distance and repeat measurement.
   6) Plot a graph between earth resistance and distance.

B) **Measurement of Insulation resistance:**
   1) Disconnect the machine and open all connections
   2) Measure the insulation resistance between field and earth, armature and earth and field and armature of machine.

**Observation:**

**To measure earth resistance:**

| SL. No. | Distance (feet) | Resistance (Ohms) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**To measure Insulation resistance:**

Armature insulator resistance =
Field insulator resistance =
Armature-Field resistance =

**Results:**

**Precaution:**

**Conclusion:**

<u>**EXPERIMENT: 7**</u>

**Title**: Phase Difference and frequency measurement.
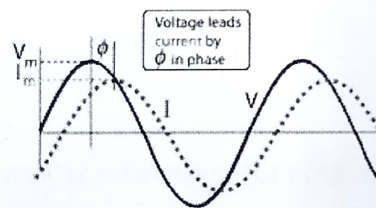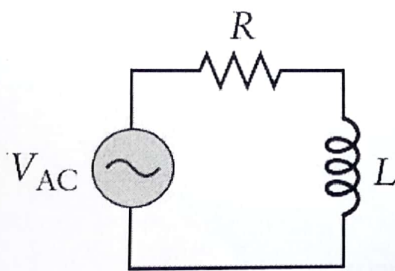
**Objective:-**

    a) To measure Phase Difference between two wave form using DSO.

    b) To measure unknown frequency from lissajous figure using DSO.

**<u>Apparatus Required</u>:**

| Name | Specification | Quantity |
|---|---|---|
|  |  |  |
|  |  |  |

**<u>Circuit Diagram</u>:**



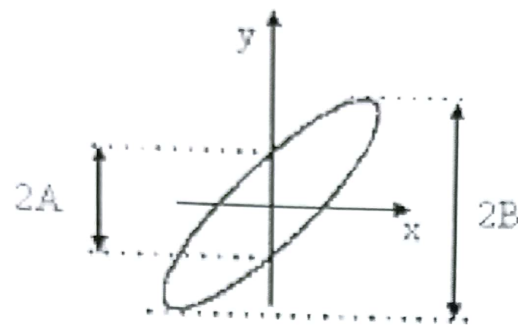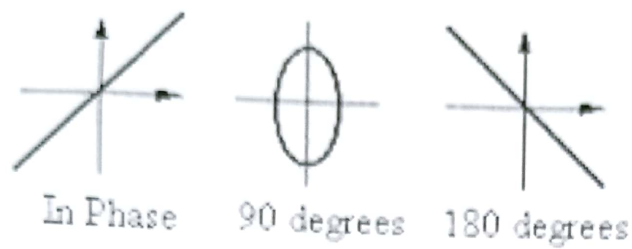**<u>Theory</u>:** Elliptical pattern for different combinations of R & L values:

The Phase angle is calculated as

$Sin\Theta = A/B$

Or, $\Theta = \sin^{-1} (A/B)$

Where, A = distance between the points where ellipse crosses the Y axis and the origin

    B = distance between the points the origin and Y axis of the maxima of the ellipse.

In Phase    90 degrees    180 degrees



General Phase Difference

$$\sin \Theta = \frac{A}{B}$$

## Procedure:

a) PHASE DIFFERENCE MEASUREMENT:

To measure the Phase difference of two Sine Waves, their frequency must be equal.

i.   Connect the circuit as per the diagram.
ii.  Connect and apply a 2V peak-peak 50Hz sine wave from the function generator to the CH1 of the CRO.
iii. Connect the output of phase shift network to the CH2 of the CRO.
iv.  Observe the webform in Y-T mode and lissajous figure in X-Y mode for different combination of R & L values.

b) FREQUENCY MEASUREMENT:

i)   Connect the two power supply with different frequency with the help of two Function Generators.
ii)  Observe the no of Peaks in X axis and Y axis in X-Y mode.
iii) Take the ratio of no of peaks in X-axis to that of Y-axis of lissajous pattern and compare with the ratio of both input frequency.

## Observation:

Table-1 : For Measurement of Phase Difference

| Sl No | Resistance | No. of Div. for 180⁰ | Least count | D (Div.) | d (Div.) | d/D | Phase Difference | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Y-T mode Degree | X-Y mode Degree |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Table-2 : For Frequency Phase Difference

| Sl No | Frequency (Hz) | | No. of turns(peaks) | | Peaks Ratio |
|---|---|---|---|---|---|
| | F1(FY) | F2 (FX) | Along Y-axis | Along X-axis | Y/X= FY/FX |
| | | | | | |
| | | | | | |
| | | | | | |

Calculations:-

Result & Conclusion:-

Precaution:-

Discussion:-