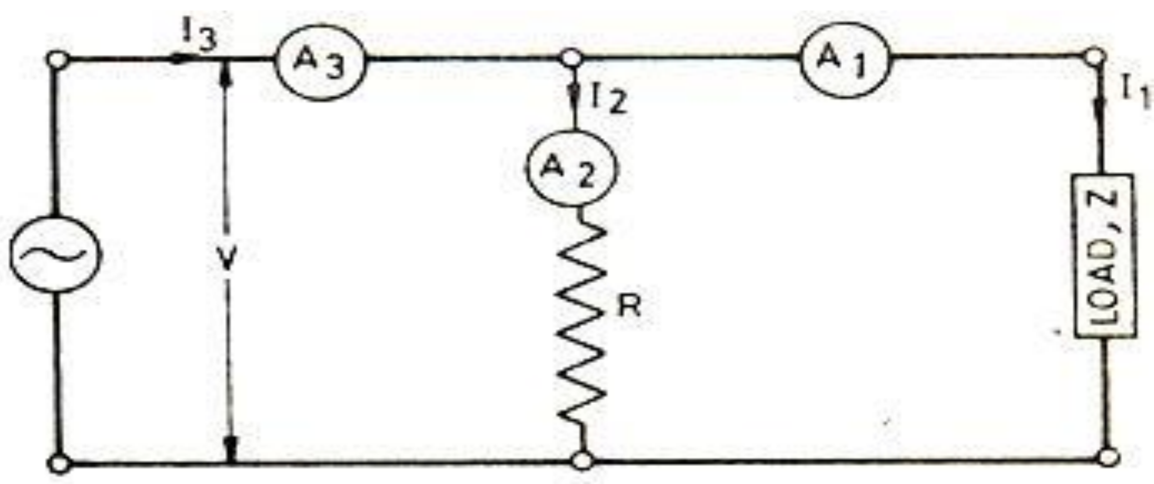
Experiment -1

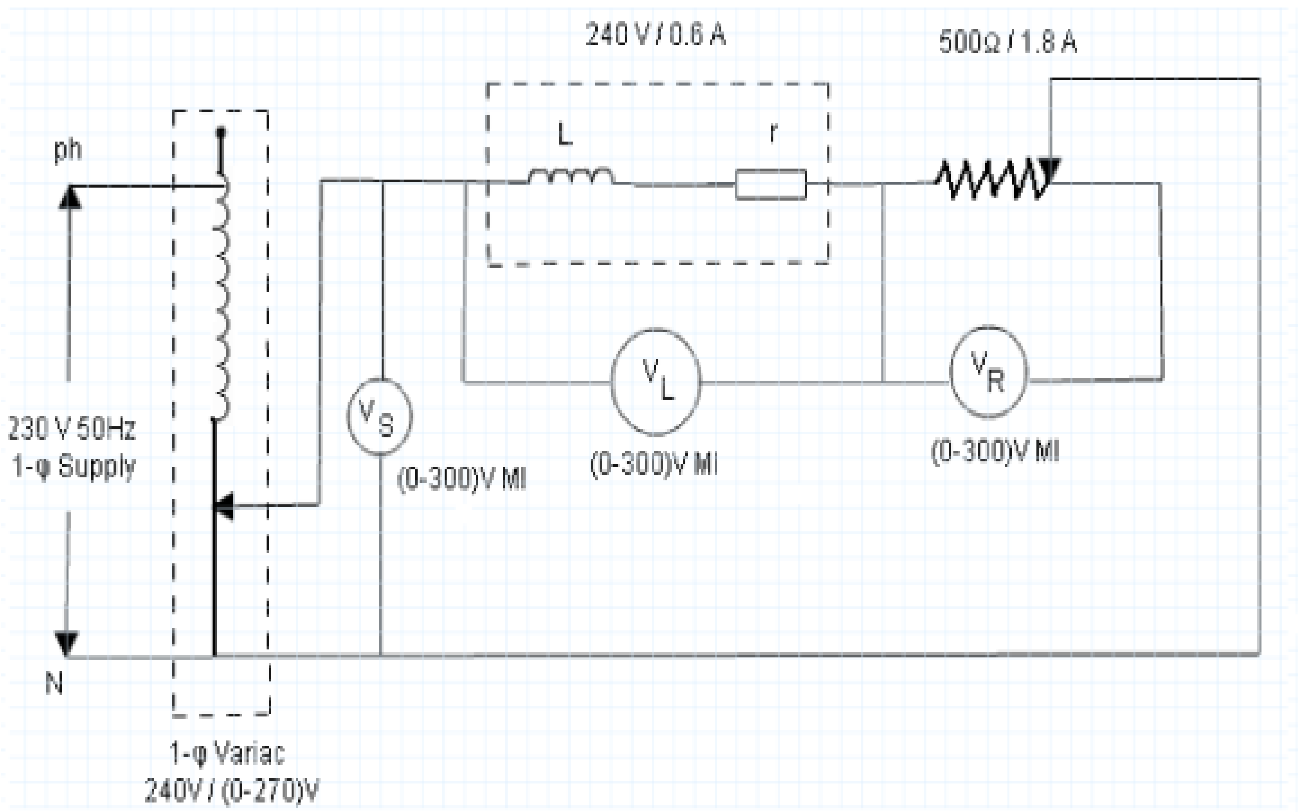
AIM: - To measurement the power by three voltmeter/ three ammeter method.

APPARATUS REQUIRED:- Auto-transformer, ammeter,voltmeter,rheostat,inductive load, connecting wires.

CIRCUIT DIAGRAM OF AMMETER:-



CIRCUIT DIAGRAM OF VOLTMETER:-



PROCEDURE:-

1. Connect the circuit as given in figure.
2. Switch ON the supply after connection and set the value of Voltage.
3. Note down the reading of all meters.
4. Switch OFF the supply.

PRECAUTION:-

1. All connection should be tight.
2. All meters should be of proper range.
3. After taking the reading of all meter and remove all the connection properly.

RESULT:-We find out the value of all meters and measure the power.

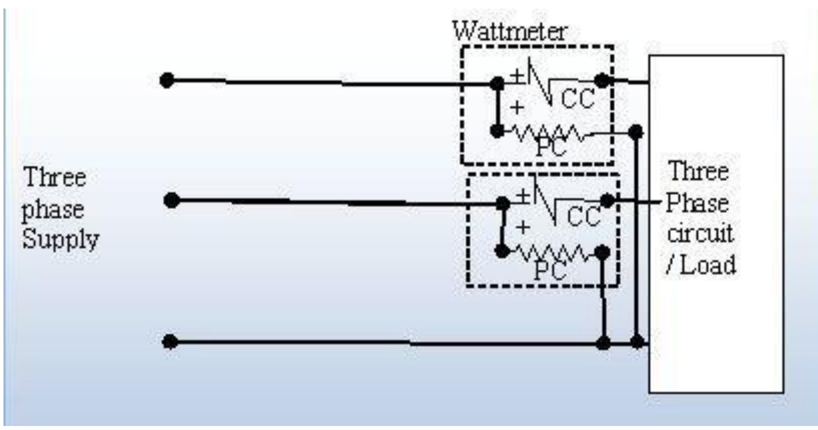
Experiment -2

AIM: - To measurement of power in three phase system by two wattmeter method.

APPARATUS REQUIRED:-Multimeter(Two),Voltmeter, Wattmeter(Two),Three phase supply, Three phase inductive load, Three phase variac.

THEORY:- Power consumed by 3-phase balanced or unbalanced load can be measured by using two wattmeters properly connected in the circuit. The current coils of the wattmeters are connected in series with the load in any two lines, two pressure coils are connected between these lines and third lines.

CIRCUIT DIAGRAM:-



PROCEDURE:-

1.Connect the circuit as per figure.

2. The output voltage of 3-phase variac is at zero or low.

3. Switch on the 3- phase supply.

4. Apply a certain voltage to the circuit and note down the readings of all the meters connected in the circuit.

5. Reduce the voltage applied to 3-phase load and then switch off the supply.

OBSERVATION TABLE:-

S.NO.	V	I	W1	W2	W1+W2	W1-W2	COS
1.							
2.							
3.							
4.							
5.							

PRECAUTION:-

1.All connection should be tight and properly.

2. Note the reading carefully and remove the connection switch off the supply.

RESULT:-

We find out the value of power, voltage current and find out power factor.

Experiment -3

AIM:- To study various types of meters.

APPARATUS REQUIRED:-Ammeter, Voltmeter, Wattmeter, Multimeter.

THEORY:-

AMMETER:-

An ammeter is a measuring instrument used to measure the electric current in a circuit. Electric currents are measured in amperes (A), hence the name. Smaller values of current can be measured using a milliammeter or a microammeter. Early ammeters were laboratory instruments only which relied on the Earth's magnetic field for operation. By the late 19th century, improved instruments were designed which could be mounted in any position and allowed accurate measurements in electric power systems.

SYMBOL OF AMMETER:-

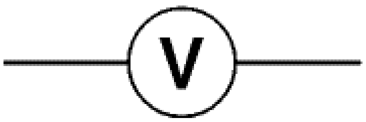
Voltmeter

A voltmeter is an instrument used for measuring the electrical potential difference between two points in an electric circuit. Analog voltmeters move a pointer across a scale in proportion to the voltage of the circuit; digital voltmeters give a numerical display of voltage by use of an analog to digital converter.

Voltmeters are made in a wide range of styles. Instruments permanently mounted in a panel are used to monitor generators or other fixed apparatus. Portable instruments, usually equipped to also measure current and resistance in the form of a multimeter, are standard test instruments used in electrical and electronics work. Any measurement that can be converted to a voltage can be displayed on a meter that is suitably calibrated; for example, pressure, temperature, flow or level in a chemical process plant. General purpose analog voltmeters may have an accuracy of a few per cent of full scale, and are used with voltages from a fraction of a volt to several thousand volts. Digital meters can be made with high accuracy, typically better than 1%. Specially calibrated test instruments have higher accuracies, with laboratory instruments capable of measuring to accuracies of a few parts per million. Meters using amplifiers can

measure tiny voltages of micro volts or less. Part of the problem of making an accurate voltmeter is that of calibration to check its accuracy. In laboratories, the Weston Cell is used as a standard voltage for precision work. Precision voltage references are available based on electronic circuits.

SYMBOL OF Voltmeter:-

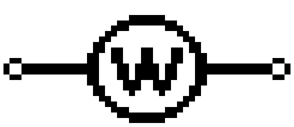


Wattmeter:-

The wattmeter is an instrument for measuring the electric power (or the supply rate of electrical energy) in watts of any given circuit.

An instrument which measures electrical energy in watt hours (electricity meter or energy analyser) is essentially a wattmeter which accumulates or averages readings; many such instruments measure and can display many parameters and can be used where a wattmeter is needed: volts, current,in amperes, apparent instantaneous power, actual power, power factor, energy in [k]Wh over a period of time, and cost of electricity consumed.

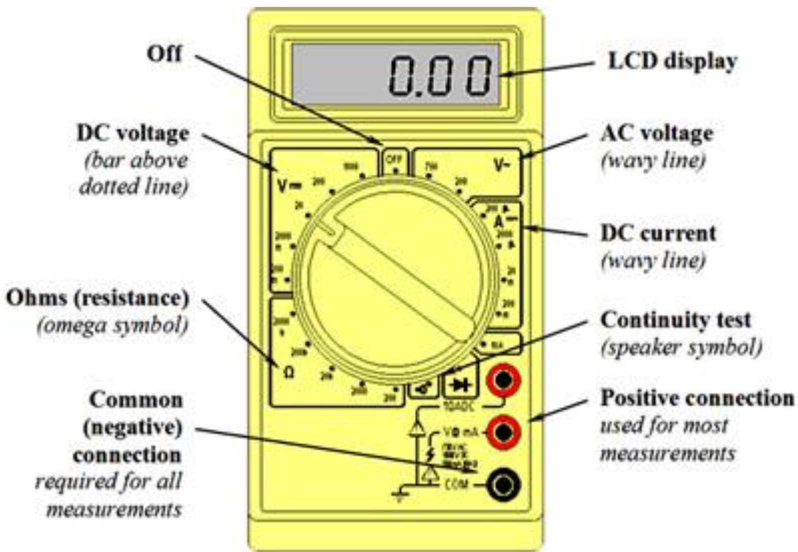
Symbol of Wattmeter:-



Multimeter:-

A multimeter or a multitester, also known as a VOM (Volt-Ohm meter), is an electronic measuring instrument that combines several measurement functions in one unit. A typical multimeter may include features such as the ability to measure voltage, current and resistance. Multimeters may use analog or digital circuits—analog multimeters (AMM) and digital multimeters (often abbreviated DMM or DVOM.) Analog instruments are usually based on a microammeter whose pointer moves over a scale calibrated for all the different measurements that can be made; digital instruments usually display digits, but may display a bar of a length proportional to the quantity being measured.

A multimeter can be a hand-held device useful for basic fault finding and field service work or a bench instrument which can measure to a very high degree of accuracy. They can be used to troubleshoot electrical problems in a wide array of industrial and household devices such as electronic equipment, motor controls, domestic appliances, power supplies, and wiring systems.



MULTIMETER

PROCEDURE:-

1. We use always voltmeter, ammeter, wattmeter and multimeter the purpose of various experiment.

PRECAUTION:-

Always use all meters carefully.

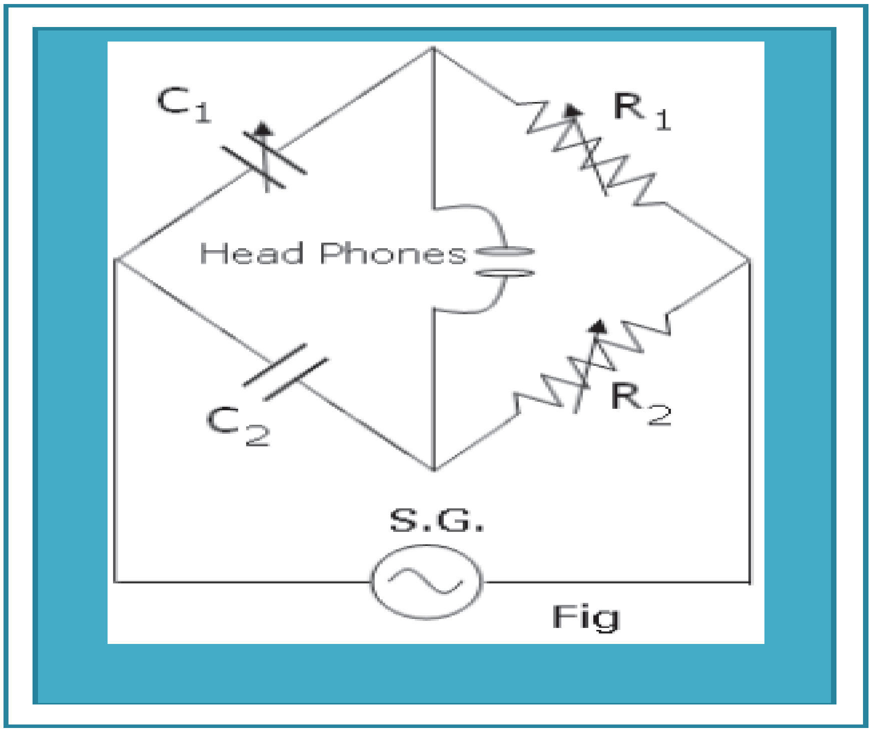
RESULT:-We have study various types of meters.

Experiment -4

Object: To compare the capacitances of two condensers by De-Sauty's bridge and hence to find the dielectric constant of medium.
Apparatus Used: Two condensers, two high resistance boxes, accumulator, Morse key, galvanometer (ballistic) and connecting wires.

Description :- The De Sauty's bridge is an A.C Bridge works on the principle of Wheat stone's bridge . This bridge is used to determine the capacity of an unknown capacitor C_2 in terms of the capacity of a standard known capacitor C_1. Here R_1 and R_2 are non - inductive resistors . R_1, R_2 ,C_1 and C_2 are connected in a Wheat stone's bridge as shown in the figure-1. When the bridge is balanced, the ratios of impedances are equal as given below.

Formula Used: The ratio of the capacitances of two condensers is given by:
C1 /C2 = R2 /R1
Where R1 and R2 are the resistances introduced in the two other arms of wheat stone's bridge,
the two arms of which contain the two capacitances, C1 and C2 (fig.)
.
Figure 1



Observations:

S.No	R_1 ohms	R_2 ohms	Direction of deflection	R_2 for balance	R_2 / R_1	Mean
		…….	left			
1	500	*	No	*	…..	
		……..	Right			
		……..	Left			
2	……	*	No	*	……	
		…….	Right			
		…….	Left			
3	…….	*	No	*	…..	
		…….	Right			

Calculations:

(i) $C_1 / C_2 = R_2 / R_1 =$ ….

Same as we calculate for other sets also.

PROCEDURE:

(I) SET THE GALVANOMETER AND LAMP AND SCALE ARRANGEMENT.

(II) MAKE THE ELECTRICAL CONNECTIONS AS IN THE FIG.

(III) ADJUST A SUITABLE RESISTANCE IN RESISTANCE BOX R1 AND DEPRESS THE KNOB O TO CHARGE THE TWOCONDENSERS. RELEASE THE KNOB O, THEREBY DISCHARGING THE CONDENSERS THROUGH THE GALVANOMETER. THE SPOT OF LIGHT WILL MOVE EITHER TOWARDS LEFT OR RIGHT.

(IV) BY TRIAL NOW INTRODUCE SUCH A RESISTANCE IN R2, OF COURSE R1 REMAINING THE SAME, THAT BY DISCHARGING THE CONDENSERS, THE DEFLECTION REMAINS UNALTERED.

(V) BY CHANGING THE VALUE OF R1 AND FINDING THE VALUE OF R2 SUCH THAT THERE IS NO CHANGE IN THE DEFLECTION OF SPOT, OTHER READINGS ARE TAKEN.

(VI) OBTAIN THE RATIO OF R2 / R1 WHICH IS ALSO THE RATIO OF THE CAPACITANCE OF TWO CONDENSERS

RESULT: THE RATIO OF THE CAPACITANCE OF THE GIVEN TWO CONDENSERS = ……

SOURCES OF ERROR AND PRECAUTIONS:

(I) THE GALVANOMETER COIL SHOULD BE MADE FREE PROPERLY.

(II) THE RESISTANCES R1 AND R2 SHOULD BE NON-INDUCTIVE.

(III) FOR SUFFICIENT SENSITIVENESS OF THE BRIDGE, THE BATTERY SHOULD BE OF HIGH E.M.F.

VIVA-VOCE

1 WHAT IS THE ORDER OF THE RESISTANCES R1 AND R2?

2 WHAT HAPPENS WHEN YOU PRESS THE MORSE KEY?

3 WHEN ARE THE CONDENSERS DISCHARGED?

4 IS THERE ANY RESTRICTION OVER THE CHOICE OF RESISTANCE NOW?

5 DOES THIS METHOD GIVE ACCURATE RESULT?

6 WHAT DO YOU MEAN BY CAPACITY OF A CONDUCTOR?

7 WHAT IS THE EFFECT OF DIELECTRIC CONSTANT ON THE CAPACITY OF A CONDENSER?

8 WHAT ARE PRACTICAL UNIT OF E.S.U. OF CAPACITY?

Experiment -5

EXPT NO **MEASUREMENT OF RESISTANCE USING WHEATSTONE BRIDGE**

AIM:

To measure the given medium resistance using Wheatstone Bridge.

OBJECTIVE:

1. To study the working of bridge under balanced and unbalanced condition.
2. To study the sensitivity of bridge.

EQUIPMENT:

1. Wheat stone Bridge kit – 1 No
2. Unknown resistance – 1 No
3. Multimeter – 1 No
4. Connecting Wires.

EXERCISE:

1. Design a bridge for the given parameters.
2. Find the unknown resistance.
3. Find the sensitivity of Bridge.

PROCEDURE:

1. The resistance to be measured is connected between XX points in the bridge kit.

2. The P/Q ratio (multiplier) is initially kept at position '1' and the deflection of the galvanometer is observed by pressing both the battery and the galvanometer keys.

3. The S arm (X 1000Ω) is adjusted and two positions are identified for which the deflection of the galvanometer is on either side of the null point and kept at the lowest value of S. Then the x100Ω, x10Ω, x1Ω knobs of S are adjusted to get null deflection. If necessary the sensitivity knob may be controlled to get appreciable deflection. [If not possible P/Q ratio is kept at suitable value ie, any one of ratios provided.]

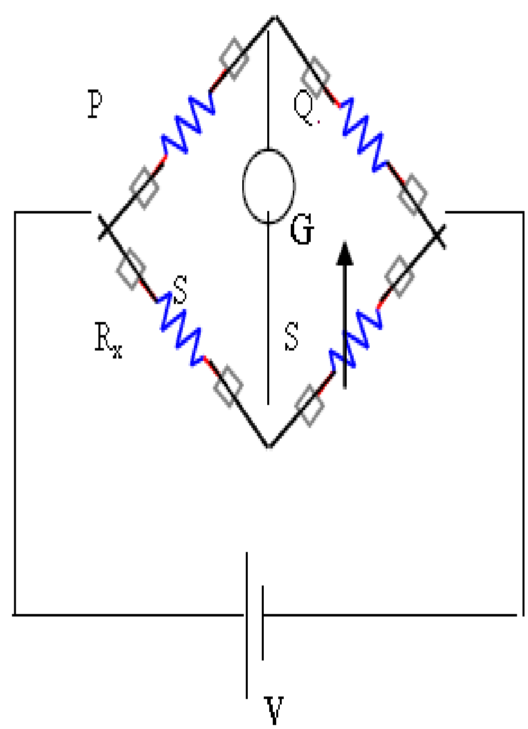
4. The value of unknown resistance is read. (S value)

5. Steps 3 and 4 are repeated for some other P/Q ratio. The mean value is taken.

6. The experiment is repeated with other samples provided.

The above experiment may be used for measuring resistance of the samples less than 1Ω to greater than 10000Ω with lesser sensitivity.

CIRCUIT DIAGRAM :



CALCULATION:

Unknown Resistance, Rx = P/Q * S (Ω)

Where P, Q = Ratio Arms.

S = Variable resistance,

Rx = Unknown resistance.

TABULAR COLUMN:

S.NO	SAMPLE	P/Q RATIO (MULTIPLIER)	S VALUE (Ω)	UNKNOWN RESISTANCE RX (Ω)

Experiment –6

EXPT NO

MEASUREMENT OF RESISTANCE USING KELVIN'S DOUBLE BRIDGE.

AIM : To measure the given low resistance using Kelvin's double bridge method.

OBJECTIVE

1. To study the working of bridge under balanced and unbalance condition.
2. To study the sensitivity of bridge.

EQUIPMENT

1. Kelvin Double bridge kit – 1 No
2. Unknown resistance – 1 No
3. Multimeter – 1 No
4. Connecting wires.

FORMULA USED:

Rx = P/Q * S ohms

Where

P,Q → First set of ratio arms.

P,q → Second set of ratio arms.

S → Standard resistance,

Rx → unknown resistance.

EXERCISE

1. Design a bridge for the given parameters.
2. Find the unknown low resistance.
3. Find the sensitivity of bridge

PROCEDURE:

1.The resistance to be measured is connected such that the leads from +C and + P are connected to one end and those from –C and –P are connected to the other end in the kit.

2.The P/Q ratio (multiplier) is initially kept at position '1' and the deflection of the galvanometer is observed by pressing the galvanometer key.

3.The 'S' arm (main dial) is adjusted and two positions are identified for which the deflection of the galvanometer is on either side of the null point. [If not some other P/Q ratio is to be tried].

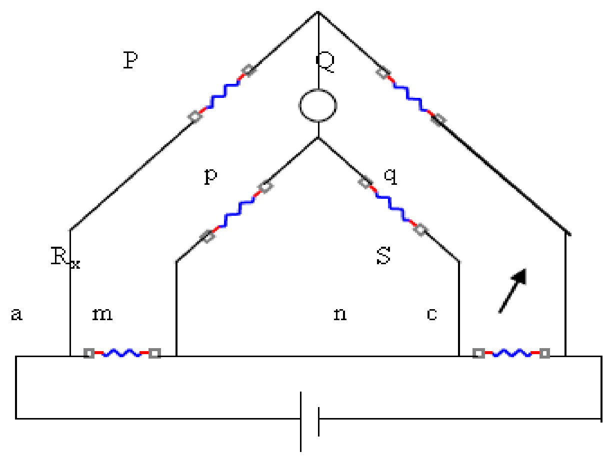
4.The lowest of the two position indicates the coarse value of the unknown resistance and the null point is obtained by adjusting the Vernier scale, with the galvanometer sensitivity knob at the maximum position.

5.The value of unknown resistance is read. [‘S’ Value]

6.Steps 3,4,5 are repeated for some other P/Q ratio for the unknown resistance. The mean value is taken.

7.The above procedure is repeated with another sample.

CIRCUIT DIAGRAM:



TABULAR COLUMN:

S.NO	SAMPLE	P/Q RATIO (Multiplier)	S VALUE		UNKNOWN RESISTANC RX (Ω)
			COARSE (Ω)	FINE (Ω	

RESULT:

The value of unknown resistance is found experimentally.

Experiment -7

EXPT NO

MEASUREMENT OF CAPACITANCE USING SCHERING BRIDGE.

AIM :

To measure the unknown capacitance using Schering bridge.

OBJECTIVE :

1. To measure the unknown capacitance.
2. To study about dissipation factor.

EQUIPMENT :

1. Schering Bridge kit – 1 No
2. Multimeter – 1 No
3. Unknown capacitance – 1 No
4. Connecting wires

PROCEDURE:

1.Connections are given as shown in the circuit diagram.

2.The value of R2 is selected arbitrarily (say1K) and R1 is varied.

3.If the selection of R2 is correct the balance point (NULL POINT) can be observed on the oscilloscope by varying R1.If not another value of R2 is chosen.[At balance the vertical line in the oscilloscope comes to a point for an particular value of R1 in the same direction.]

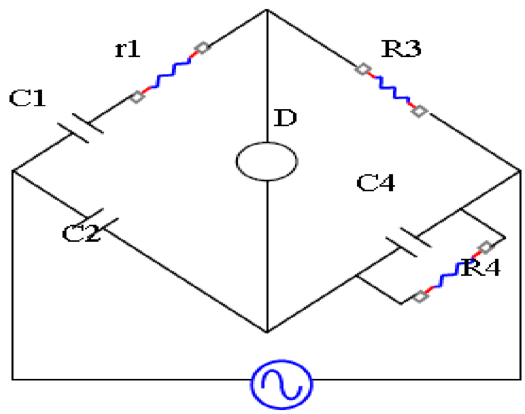
4.The capacitor C1 can be varied for fine balance adjustment.

5.When the balance condition is reached, the trainer kit is switched OFF and the value R1 is measured using a multimeter.

6.The value of unknown capacitance is calculated.

7.The experiment is repeated for various samples provided.

CIRCUIT DIAGRAM :



EXERCISE

1. Design a bridge circuit for the given parameters.
2. Find the dissipation factor.
3. Fluid the unknown capacitance.
4. R2 = Non-Inductive Variable Resistor

CALCULATION:

Unknown capacitance, Cx = R1/R2 * C3,
Where C3 = Known Capacitance, Microfarads

TABULAR COLUMN:

S.NO	SAMPLE	R2 (Ω)	R1 (Ω)	UNKNOWN CAPACITANCE (Farads)

RESULT:

The value of unknown capacitance is found experimentally by using the Schering bridge.

Unknown Capacitance, Cx =

EXPT NO

MEASUREMENT OF INDUCTANCE USING MAXWELLS BRIDGE.

AIM

To find the unknown inductance and Q factor of a given coil.

OBJECTIVE

1. To find the unknown inductance of the given coil using bridge circuit.

2. To study that Maxwell inductance, capacitance bridge is suitable for the measurement of law Q coils.

EQUIPMENT

1.
2. Maxwell's inductance Capacitance Bridge kit – 1 No
3. Multimeter – 1 No
4. Unknown Inductance – 1 No
5. Connecting wires

PROCEDURE:

1.Connections are given as shown in the circuit diagram.

2.The value of R2 is selected arbitrarily (say1K) and R1 is varied.

3.If the selection of R2 is correct the balance point (NULL POINT) can be observed on the oscilloscope by varying R1.If not another value of R2 is chosen.[At balance the vertical line in the oscilloscope comes to a point for an particular value of R1 in the same direction.]

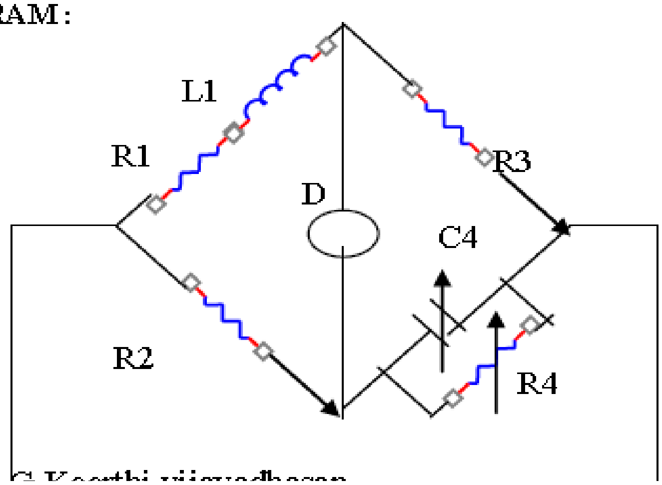
4.The inductance can be varied for fine balance adjustment.

5.When the balance condition is reached, the trainer kit is switched OFF and the value R1 is measured using a multimeter.

6.The value of unknown inductance is calculated.

7.The experiment is repeated for various samples provided.

CIRCUIT DIAGRAM:



Experiment - 9

EXPT NO

MEASUREMENT OF INDUCTANCE USING MAXWELLS BRIDGE.

AIM

To find the unknown inductance and Q factor of a given coil.

OBJECTIVE

1. To find the unknown inductance of the given coil using bridge circuit.

2. To study that Maxwell inductance, capacitance bridge is suitable for the measurement of law Q coils.

EQUIPMENT

1.
2. Maxwell's inductance Capacitance Bridge kit – 1 No
3. Multimeter – 1 No
4. Unknown Inductance – 1 No
5. Connecting wires

PROCEDURE:

1.Connections are given as shown in the circuit diagram.

2.The value of R2 is selected arbitrarily (say1K) and R1 is varied.

3.If the selection of R2 is correct the balance point (NULL POINT) can be observed on the oscilloscope by varying R1.If not another value of R2 is chosen.[At balance the vertical line in the oscilloscope comes to a point for an particular value of R1 in the same direction.]

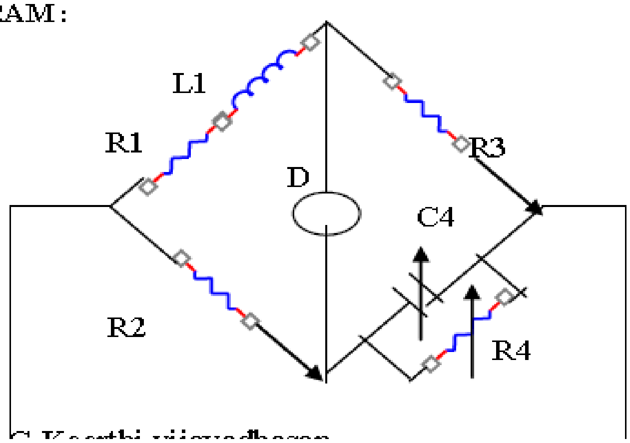
4.The inductance can be varied for fine balance adjustment.

5.When the balance condition is reached, the trainer kit is switched OFF and the value R1 is measured using a multimeter.

6.The value of unknown inductance is calculated.

7.The experiment is repeated for various samples provided.

CIRCUIT DIAGRAM :



MEASUREMENT OF IRON LOSS IN RING SPECIMEN USING MAXWELL'S BRIDGE

Date:
Expt. No:

Aim: To measure the iron loss in a ring specified by using Maxwell's bridge.

Apparatus required:

S.No	Components	Quantity
1.	Maxwell bridge setup	1
2	In built audio Oscillator	1
3	Ring Specimen with (N) No. of (windings)	1
4	Multimeter	1
5	LCR meter	1
6	Oscilloscope	1
7	Connecting wires/ Patch chords	As required

Formula:

$$R_s = R_3/R_4\ [R_2+r_2]$$

$$Pi = I^2 \left[\frac{R_4}{R_3+R_4}\right] (R_s - R_w)$$

Where

$R_w \rightarrow$ Resistance of winding or coil (Ω)

$R_s \rightarrow$ Effective resistance of AB be R_s

$R_2 \rightarrow$ Variable Resistance connected in series (Ω)

$R_3 \rightarrow$ Known non-Inductive resistance (Ω)

$R_4 \rightarrow$ Variable non-Inductive resistance (Ω)

Pi $\rightarrow$ Iron Loss

Procedure:

i) Switch ON the trainer kit.

ii) Give the connection as shown in the circuit diagram.

iii) Connect the Ring specimen in the arm marked Lx.

vii) Observe the sine wave output at the output of imbalance amplifier.

viii) By varying the potentiometer R_3 and R_4 balance the bridge.

ix) If the selection R3 and $R_4$is correct the bridge gets balanced (null position) (DC line) can be observed on the oscilloscope.

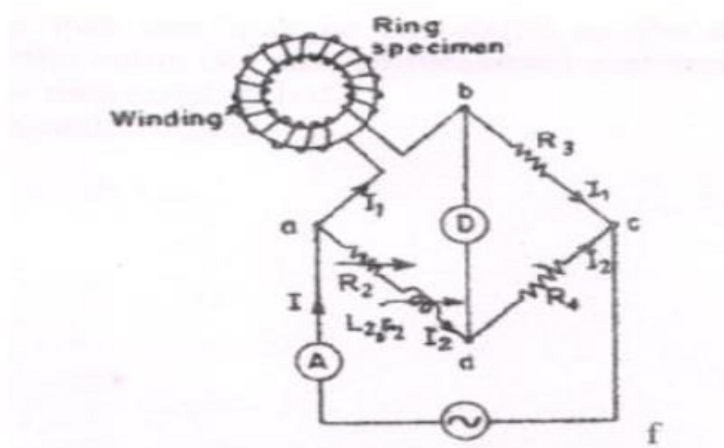
x) The balance condition can be observed through an oscilloscope.

xi) Otherwise connect the O/P at the arm BD to the imbalance amplifier and the O/P of imbalance amplifier to the speaker. At balance condition there will be no noise in the speaker.

xii) Disconnect the circuit, and measure the value of R_4, R_3 and R_2 by using a multi-meter.

xiii) Substitute these values in formula to find the iron loss in the ring specimen.

CIRCUIT DIAGRAM



Tabulation:

Winding Resistance Rw(Ω)	Resistance R_2(Ω)	Resistance r_2(Ω)	Resistance R_3(Ω)	Resistance R_4(Ω)	Current I(A)	Effective Resistance R_s(Ω)

Result:

Thus the value of iron loss in the ring specified is measured by using Maxwell's bridge.

Experiment -10

EXPT NO **CALIBRATION OF 1∅ ENERGYMETER.**

AIM:

To calibrate the given single phase energy meter at unity and other power factors

OBJECTIVES

1. To study the working of energy meter
2. To accurately calibrate the meter at unity and other power factor
3. To study the % of errors for the given energy meters

EQUIPMENT

1. Energy meter – 1 No
2. Wattmeter – 1 No
3. Stop watch – 1 No
4. M.I Ammeter – 1 No
5. M.I Voltmeter – 1 No

APPRATUS REQUIRED:

S.NO	NAME OF THE APPARATUS	RANGE	TYPE	QTY

PROCEDURE:

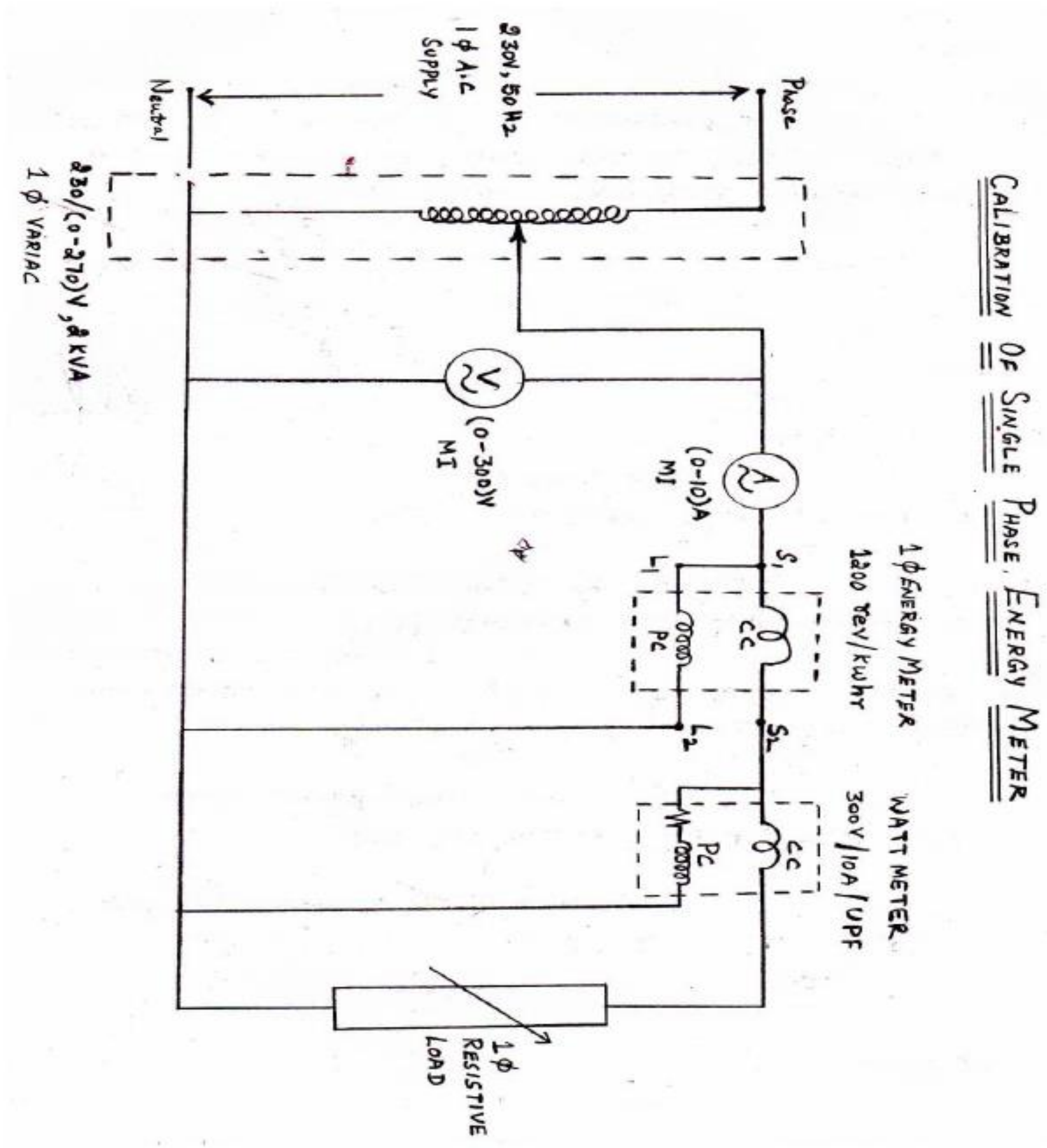
1.Connections are given as shown in the circuit diagram.

2.Supply is switched ON and load is increased in steps, each time noting the readings of ammeter and wattmeter. A the actual time taken for 1 revolution of the disc is measured using stop watch.

3.Step 2 is repeated till rated current of the energy meter is reached.

4. % Error is calculated and calibration curve is drawn.

CIRCUIT DIAGRAM:



EXERCISE

1. Measure the experimental energy consumed
2. Calculate the theoretical energy
3. Calculate the percentage of error
4. Draw the calibration curve

TABULAR COLUMN:

S.NO	LOAD CURRENT I (Amps)	WATTMETER READING t(Sec)	INDICATED POWER W1 (watts)	% ERROR

CALCULATION:

Let x revolution / kwh be the rating.

Now x revolution = 1 kwh = 1* 3600*1000* watt-sec.

Constant k of energymeter = $3600 * 10^3/x$ watt-sec

For each load indicated power Wi is given as Wi = k/t watts

Where

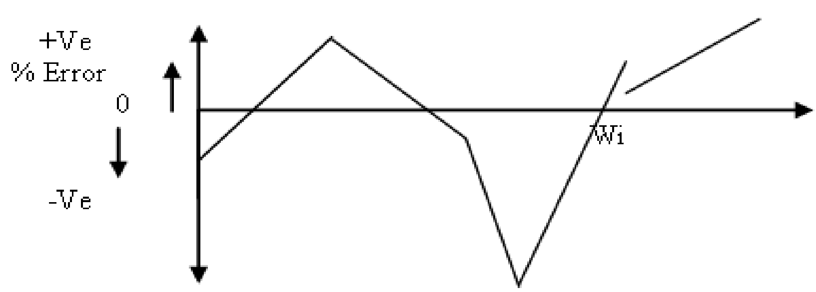
K= energymeter constant (watt-sec)

T= time for 1 revolution(sec).

Actual power is indicated by the wattmeter reading.

% error = Wi-Wa/Wi * 100. It can be zero +ve or –ve.

MODEL GRAPH:



RESULT:

From the calibration curve it is possible to predict the error in recording the energy. So the correction can be applied to the energy meter reading so that correct energy reading can be obtained and used.

Experiment -11

MEASUREMENT OF 3 PHASE POWER AND POWER FACTOR

AIM

To conduct a suitable experiment on a 3-phase load connected in star or delta to measure the three phase power and power factor using 2 wattmeter method

OBJECTIVES

1. To study the working of wattmeter
2. To accurately measure the 3 phase power
3. To accurately measure the power factor
4. To study the concept of star connected load and delta connected load

EQUIPMENT

1.	3 phase Auto transformer	– 1 No
2.	M.I Ammeter	– 1 No
3.	M.I Voltmeter	– 1 No
4.	Wattmeter	– 1 No

EXERCISE

1. Measure the real power, reactive power and power factor of 3 phase resistive inductive load.
2. Measure the real power, reactive power and power factor of 3 phase resistive capacitive load.

PROCEDURE:

1. Connection are made as per the circuit diagram, Keeping the inductive load in the Initial position.
2. Supply switch is closed and reading of ammeter and wattmeter are noted .If one of the wattmeter reads negative, then its potential coils (C and V) are interchanged and readings are taken in negative.

3 The above procedure is repeated for different values of inductive coil. Care should be taken that current should not exceed 10A during the experiment.

S.NO	I	W1	W2	POWER P	P.F
	(Amps)	(Watts)	(Watts)	(Watts)	COS∅

FORMULA USED:

1. Total power $P = W1+W2$ (W)
2. $\varnothing = \tan^{-1} \sqrt{3}[W1-W2/W1+W2]$
3. $P.F = \cos\varnothing$.

Experiment -12

Experiment No-04

Aim:- Measurement of the high resistance by using loss of charge method.

Apparatus:- Multimeter –1no
Ammeter-(0-200ma)-1no
Voltmeter –(0-30v)-1no
Capacitor-10uf-1no
Resister-100K-1no
Power supply-(0-30v)-1no

Circuit Diagram:-

Observation Table:-

S. NO.	Time (sec)	V(without R)	V(with R)	$Log_{10}(V/v)$ without R	$Log_{10}(V/v)$ with R

Theory:-

In this method the resistance which is measured is connected in parallel with the capacitor C and the electronic voltmeter V. The capacitor is the charged up to some suitable voltage by means of the battery having the voltage V and is then allowed to discharge through the resistance.

The terminal voltage is observed over the considerable period of the time during discharge.

Let ,
V=initial voltage on the charged capacitor .
.v=instantaneous discharging voltage.
I=the discharging capacitor current through the unknown resistor at time "t".
Q=the charge still remaining in the capacitor.

$I = dq/dt = -c dv/dt$ since$[I = V/R]$

$V/R + C\ dv/dt = 0$ (1)

$1/RC\ dt + 1/V.dV = 0$

integrating both sides

$t/RC + \log_e v + K = 0$ (2)

K is const. of integration

At initial condition

When T=0 , v=V from equ. (2)

$K = -\log_e V$

now equ. (2) becomes

$t/RC + \log_e v - \log_e V = 0$

therefore. $\text{Log}_e (v/V) = -t/RC$

$v/V = e^{-t/RC}$

$v = V * e^{-t/RC}$

Taking log on both sides

$\log_e v = \log_e V + \log_e e^{-t/RC}$

$R = t/C * \log_e(V/v)$

$R = 0.4343 * t/C * \log_{10}(V/v)$

Procedure:-

1) Connections is make as per the circuit diagram.
2) Close the switch s and keep s2 open the capacitor charge by own leakage method.
3) New open reading and voltmeter .as its own resistance.
4) Note down the reading of the voltmeter **Vs** equal interval of the time

<u>Result</u>:- High resistance of the resistance is calculated by using loss of charge method.

<u>Viva Questions</u>:- 1)Why this method is called as loss of charge method?

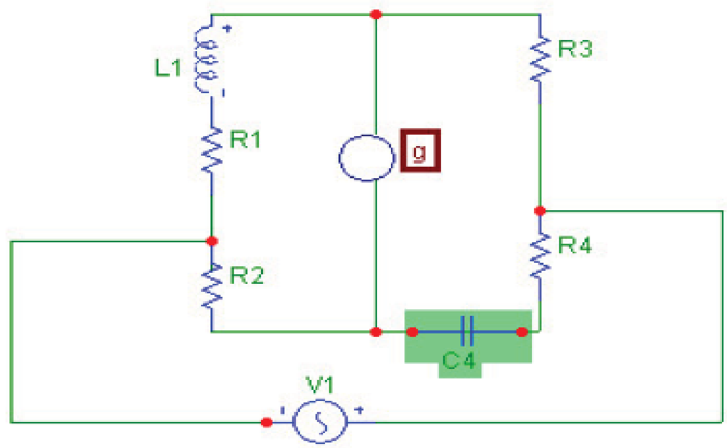
2)What errors occur while performing this practical?

Experiment -13

Aim:- Measurement of the unknown inductance by using Hay's bridge method.

Apparatus:- Multimeter
LCR meter
Hay's bridge kit,
Patch cords.

Circuit Diagram:-



Theory:-

The hays bridge is the modification of the Maxwell Bridge. This bridge uses a resistance in series with the standard capacitor. The bridge has four resistive arms in which the arms one is consists of the resister R_1, Lx .The arm 2 is consists of the variable resistance R_3.The low value of the resistance is obtain by the low resistive arms of the bridge. The value of R_4 and C_4 is the standard value of the capacitor and resistance.

By using the unknown inductance having a resistanceR_1. R_2, R_3,R_4-is the known non-inductive resistance and C_4 is standard value of the capacitor. The unknown value of inductance and Quality factor of the Bridge is obtained by formula.

$Lx = (R_2R_3C_4) /(1+\omega^2R_4^2C_4^2)$_

Quality factor $(Q)=(1/\omega^2R_4^2C_4^2)$

Basic AC bridges consist of four arms, source excitation and a balanced detector. Commonly used detectors for AC bridges are:

(1) Head phones
(2) Vibration galvanometers
(3) Tunable amplifier detectors

Vibration galvanometer is extremely useful at power and low audio frequency ranges. Vibration galvanometers are manufactured to work at various frequency ranging from 5 KHZ to 1 KHZ. But one most commonly used between 200HZ.

Advantage-1) This Bridge gives very simple expression for unknown for High Q coil.
2) This bridge also gives a simple expression for Q factor.

Disadvantage-1)The hays bridge is suited for the measurement of the High Q inductor.
2)It is used to find the inductor having the q value of the smaller then 10.

.

Procedure:-

1) Study the circuit provided on the front panel of the kit.
2) Connect unknown inductance LX_1 in the circuit. Make all connections to complete the bridge.
3) Put the supply ON
4) Set the null point of galvanometer by adjusting variable resistance R_3.
5) Note value of R_2, R_3, and C_4 by removing connection by patch cords.
6) Calculate theoretical value of LX_1 using $L=R_2R_3C_4$
7) Measure value of LX_2 by LCR meter and compare it.
8) Repeat process for LX_2.

Result:- The unknown inductance is measured using Hay's bridge and is found to be___

Viva Questions:-

1)What is the Q factor of the coil?
2) Which bridges are used for measurement of inductances?