ANDERSON BRIDGE

Object: To determine the self inductance of a coil by Anderson bridge.

Apparatus Used: Anderson bridge, connecting wires, Head phone.

Formula Used: The following formula is used for the determination of self inductance of coil.

$$L = C\left[RQ + rR\left\{1 + \frac{Q}{P}\right\}\right]$$

Since, $S = \frac{Q}{P}R$ **; thus** $L = C\left[RQ + rR\left\{1 + \frac{S}{R}\right\}\right]$

$$\boxed{L = C\left[RQ + r\{R + S\}\right]}$$

If P=Q **then** S=R; **Hence**, $L = C\left[RQ + 2rR\right]$

$$\boxed{L = RC\left[Q + 2r\right]}$$

Where symbols have their usual meaning as shown in figure.

Circuit Diagram:

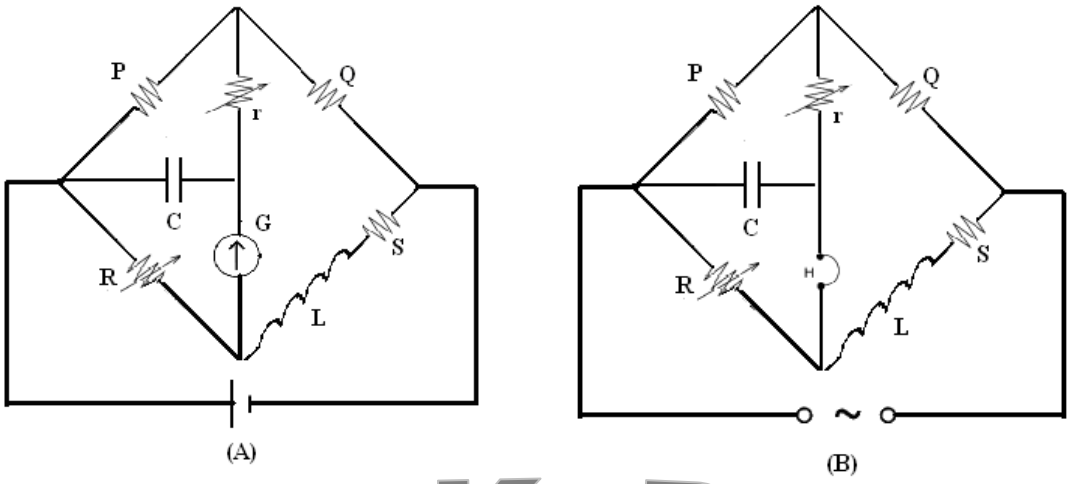

Fig (A): Bridge with DC source and galvanometer
Fig (B): Bridge with AC source and Head Phone

Procedure:

1. Make connections as shown in fig A. i.e. connect source point with DC source, connect galvanometer at detector point and inductor at unknown point in your given kit.
2. Now vary R, keeping r equal to zero, so that deflection in galvanometer becomes zero. This is a DC balancing. Note this value of R.
3. Now, make connections as shown in fig B. i.e. replace DC source with AC source, replace galvanometer with Head phone.
4. Now vary r keeping the same value of R, so that no sound is heard in Headphone. This is known as AC balancing. Note the value of r.
5. Calculate the value of L using above formula and given value of C &Q for your circuit.
6. Repeat the Points 1 to 5 for the different inductors.
7. Repeat the Points 1 to 6 selecting different value of C.

Observation:

1. P=…….. Ω
2. Q=…….. Ω
3. Table for value of R and r when C=…….. μf

Sr.No.	**Inductor**	**R**(Ω) {for zero deflection in Galvanometer (G) under DC balancing}	**r**Ω) {for no sound in Head phone (H) under AC balancing}	**L(mH)** (Inductance) $L = RC[Q + 2r]$
1.	First			$L_1 =$
2.	Second			$L_2 =$
3.	Third			$L_3 =$

4. Table for value of R and r when C=…….. μf

Sr.No.	**Inductor**	**R**(Ω) {for zero deflection in Galvanometer (G) under DC balancing}	**r(**Ω) {for no sound in Head phone (H) under AC balancing}	**L(mH)** (Inductance) $L = RC[Q + 2r]$
1.	First			$L_1' =$
2.	Second			$L_2' =$
3.	Third			$L_3' =$

Calculation: Show calculation for all value of inductance (L)

Result:

1. Inductance of Ist inductor = $\frac{L_1 + L_1'}{2}$ =……mH
2. Inductance of IInd inductor = $\frac{L_2 + L_2'}{2}$ =……mH
3. Inductance of IIIrd inductor = $\frac{L_3 + L_3'}{2}$ =……mH

Precaution:

1. To avoid inductive effect short straight wires should be used.
2. Movement in galvanometer should be free.
3. The resistances should be high and non-inductive.