

Experiment 6

Experiment Name: To measure capacitance by Desauty's bridge.

Apparatus Required:

1. Desauty's Bridge Trainer
2. Multi meter
3. 2mm Patch cords

Theory:

Capacitor:

A capacitor is a passive electronic component that stores energy in the form of an electrostatic field.

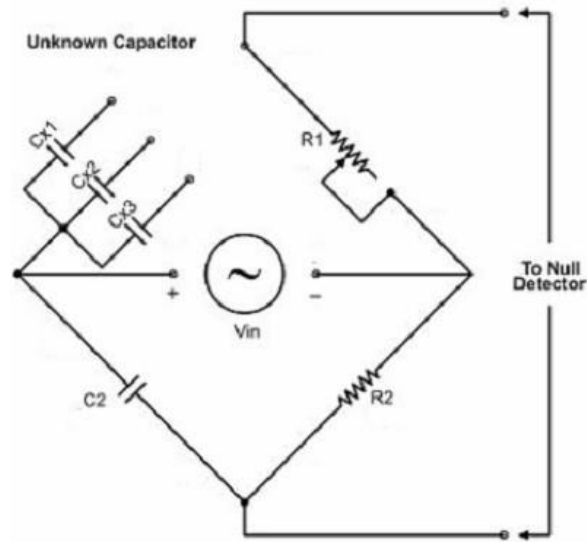
In its simplest form, a capacitor consists of two conducting plates separated by an insulating material called the dielectric. The capacitance is directly proportional to the surface areas of the plates, and is inversely proportional to the separation between the plates.

Capacitance also depends on the dielectric constant of the substance separating the plates. Desauty's bridge:

The Desauty's bridge is a direct carryover of the Wheatstone bridge with the DC Source replaced by an AC source.

The null detector we will be using also has an amplifier where the gain can be adjusted. This is connected to Null detector which is used for getting the null point.

$$C_x = R_2 \times \frac{C_2}{R_1}$$



Procedure:

1. Connect mains cord to the Trainer.
2. Connect terminal 1 to 4(for evaluating unknown capacitance C_x1).
3. Rotate variable resistance R1 towards anti clockwise direction.
4. Select Frequency Selector f or any desired range of frequency.
 - 100 Hz to 1 kHz
 - 1 kHz to 10 kHz
 - 10 kHz to 60 kHz

7. For example 2 kHz frequency, select frequency select or between the ranges 1 kHz-10 kHz.
 8. Use Frequency Variable knob to set 2 kHz frequency on display screen.
 9. Connect terminal 19 to 6 and 20 to 7.
 10. Now switch 'On' the power supply.
 11. Set toggle of null detector towards 'on' condition.
 12. Vary Amplitude Variable f or enough sound of speaker.
 13. Vary resistance R1 towards clockwise direction slowly. (Sound diminishes). Keep varying R1 until you get very low sound or null sound (null condition).
1. Now remove the patch cord between terminal 1 & 4 and record the value of R1 in the observation table using multimeter.

Observation Table:

S.No.	Unknown capacitor	Frequency		Resistance R ₁ ohm	Resistance R ₂ ohm	Capacitor C ₂ μF
		<i>f</i> ₁	<i>f</i> ₂			
1.	Cx1	<i>f</i> ₁				
		<i>f</i> ₂				
		<i>f</i> ₃				
2.	Cx2	<i>f</i> ₁				
		<i>f</i> ₂				
		<i>f</i> ₃				
3.	Cx3	<i>f</i> ₁				
		<i>f</i> ₂				
		<i>f</i> ₃				

Calculations:

1. For unknown Capacitance Cx1 on frequency f_1 :

$$C_{x1} = R_2 \times \frac{C_2}{R_1}$$
$$= \dots\dots\dots \mu\text{F}$$

Similarly calculate Capacitance Cx1 on frequency f_2 and f_3 . and take the mean value.

2. For unknown Capacitance Cx2 on frequency f_1 :

$$C_{x2} = R_2 \times \frac{C_2}{R_1}$$
$$= \dots\dots\dots \mu\text{F}$$

Similarly calculate Capacitance Cx2 on frequency f_2 and f_3 and take the mean value.

3. For unknown Capacitance Cx3 on frequency f_1 :

$$C_{x3} = R_2 \times \frac{C_2}{R_1}$$
$$= \dots\dots\dots \mu\text{F}$$