Experiment no.3

§ Full Wave Rectifier (Centre Tap) §

3.1 Objective:

- To convert AC to DC.
- To be familiar with the full wave rectifier.

3.2 Theory:

the full wave rectifier converts both positive and negative half cycles of the input AC signal into output pulsating DC signal.

The full wave rectifier is further classified into two types:

1. **center tapped full wave rectifier**
2. **Full wave bridge rectifier.**

- ***Center tapped full wave rectifier:***

A center tapped full wave rectifier is a type of rectifier, which uses a center-tapped transformer and two diodes to convert the complete AC signal into DC signal.

The center tapped full wave rectifier is made up of

1. AC source.
2. center tapped transformer.
3. two diodes.
4. load resistor.

- ***Centre-tapped Transformer***: – It is a normal transformer with one slight modification. It has an addition wire connected to the exact center of the secondary winding. This type of construction divides the AC voltage into two equal and opposite voltages namely +Ve voltage (Va) and -Ve voltage (Vb). The total output voltage is:

V=Va +Vb

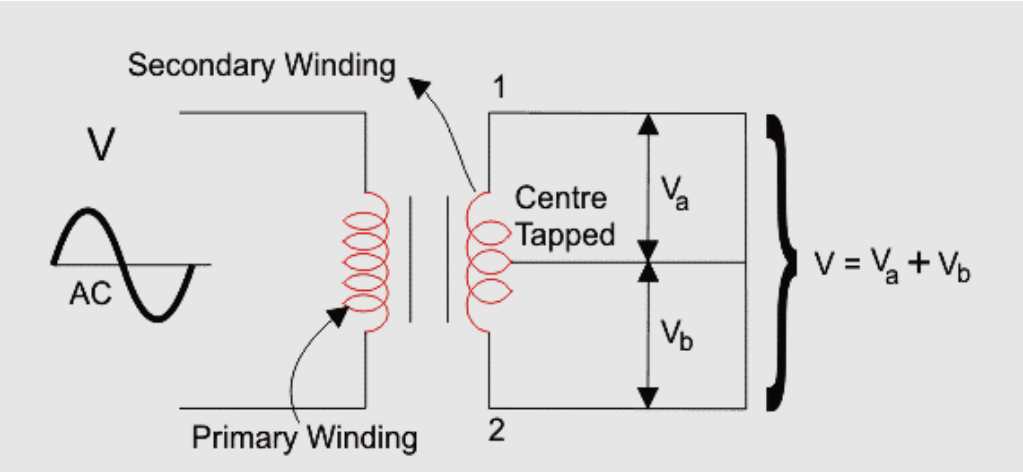

Figure (1)

- ***Working of Centre-tapped Full Wave Rectifier*:**

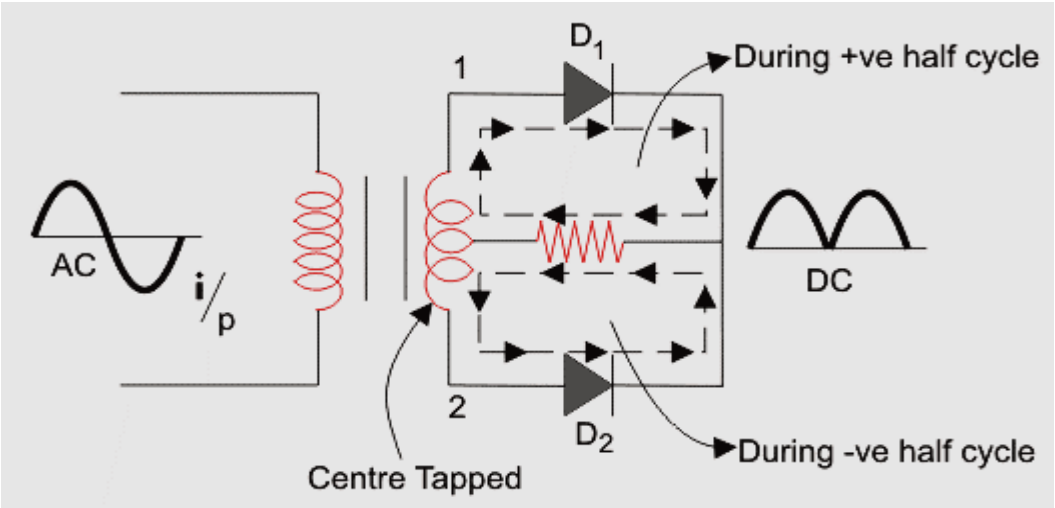

Figure (2)

We apply an AC voltage to the input transformer. During the positive half-cycle of the AC voltage, terminal 1 will be positive, centre-tap will be at zero potential and terminal 2 will be negative potential. This will lead to forward bias in diode D1 and cause current to flow through it. During this time, diode D2 is in reverse bias and will block current through it.

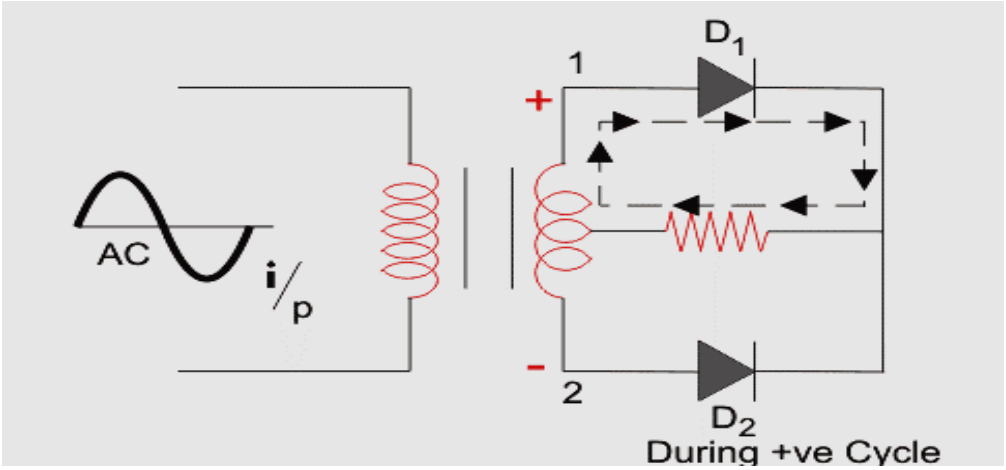

Figure (3)

During the negative half-cycle of the input AC voltage, terminal 2 will become positive with relative to terminal 2 and centre-tap. This will lead to forward bias in diode D2 and cause current to flow through it. During this time, diode D1 is in reverse bias and will block current through it.

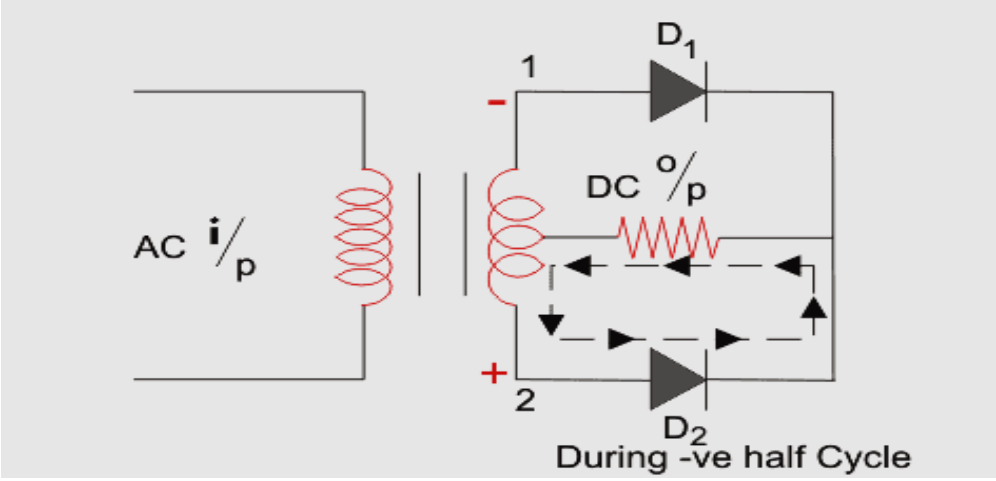

Figure (4)

- ***Output Waveforms:***

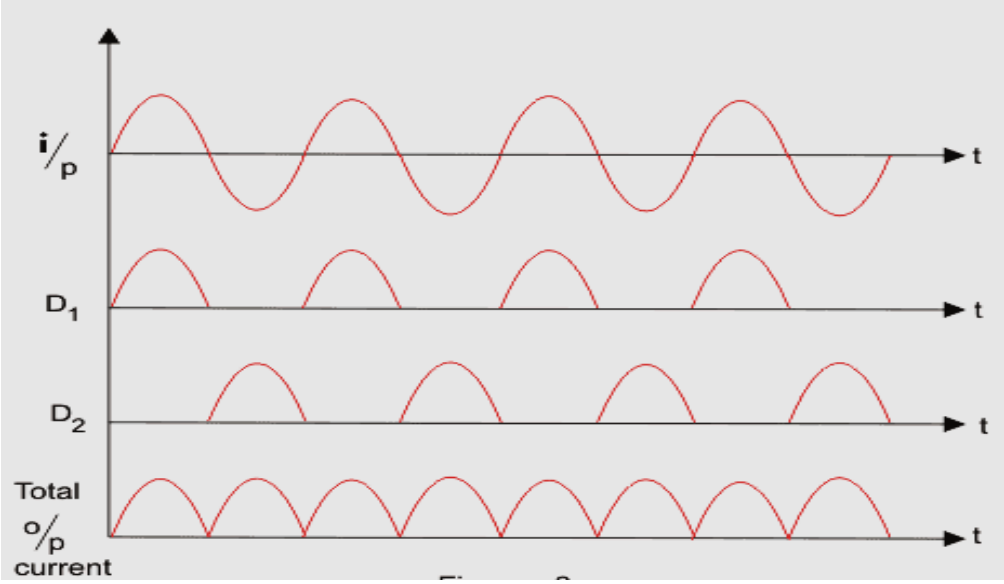

Figure (5)

3.3 Procedure:

1. Connect the circle shown in the figure (6).

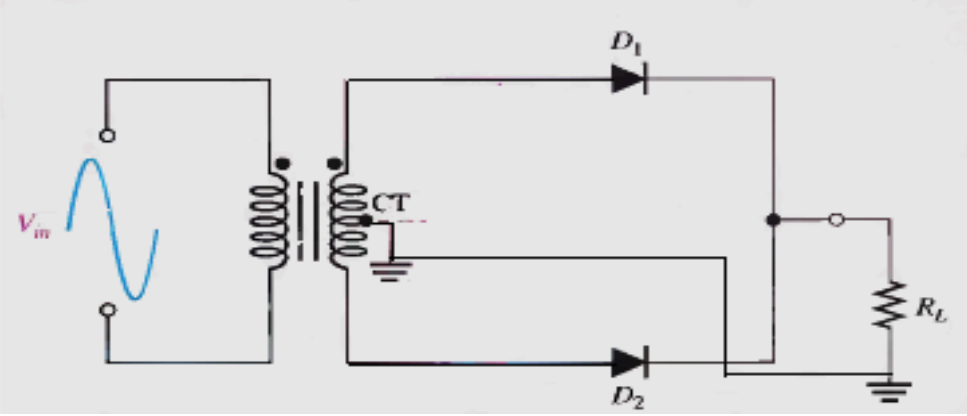

Figure (6)

2. Set the function generator by an AC voltage (4 V) and a frequency (200HZ) and draw the input waveform.
3. Connect the Oscilloscope to both ends of the resistance, Draw the wave shown in the screen of the Oscilloscope.

3.4 Discussion:

1. What is full wave rectifier?
2. What are the types of full Wave Rectifier?
3. What are the components of the Center Tab Full Wave rectifier?
4. Calculate the value of Vr.m.s and Vd.c for the output wave?

$$\mathbf{Vr.m.s=Vp/\sqrt{2}}$$

$$\mathbf{Vd.c = Vav = 2\ Vpeak\ /\ \pi}$$

- (Vav) or (Vdc) average value of Output voltage.
- (Vpeak) Peak voltage of input wave.
- (Vr.m.s) Root mean square of output voltages.