Course code: ETE203

Course Title: Electronics Device and Circuit – I Lab

Experiment No: 04

Experiment Title: Study of Half wave rectifier.

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Theory:

Half wave rectifier is defined as a type of rectifier that allows only one half cycle of AC voltage wave form to pass while blocking the other half cycle. For the positive half cycle of the AC source voltage, the diode is forward biased and that's why it becomes a short circuit which means it allowing current to pass through. So it becomes a closed circuit. For the negative half cycle of the AC source voltage, the diode is now in reverse bias and that's why it become an open circuit which means no current is able to pass through it. During this time the output voltage is equal to zero.

Apparatus required:

1. Step down Transformer (220V, AC, 50Hz)
2. Resistor (10kΩ)
3. CRT Oscilloscope.
4. Digital multi-meter.
5. Breadboard
6. Capacitor (C1= 22µF)
7. Capacitor (C2=470µF)
8. Wires as required

Picture of Circuit:
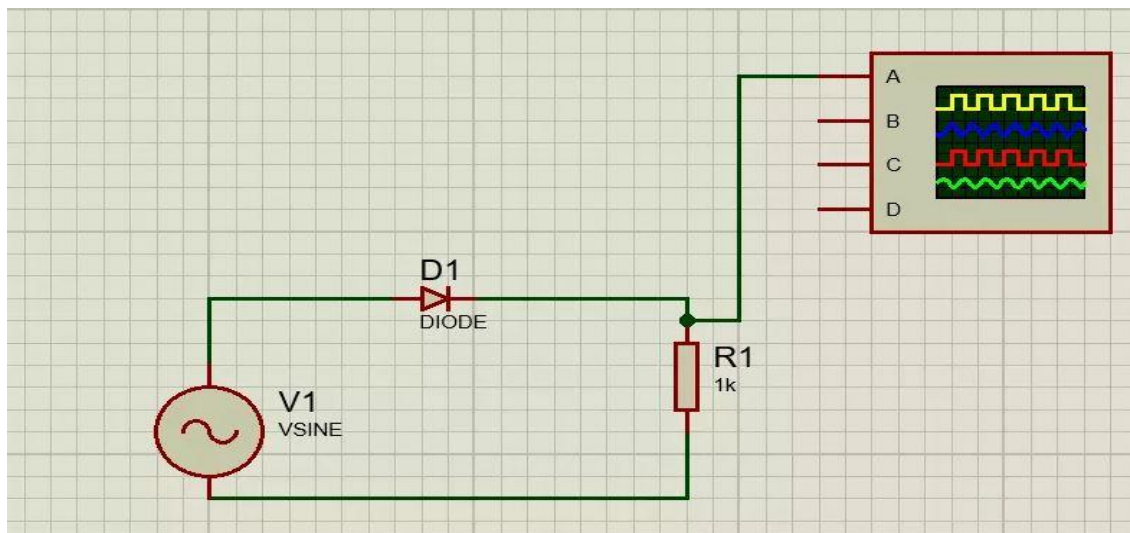
Procedure:

1. Connect the circuit as shown in the circuit diagram. Setup the circuit shown in Fig.

2. Set the 10 volts peak-to-peak, 1 KHz sine wave signal from the signal generator and observe it in channel-1 of the oscilloscope.

3. Measure the input voltage VIP and output voltage VOP, using both the voltmeter and oscilloscope.

4. The peak values of the input VIP and output VOP, signals and write them down.

5. Give input to the circuit and observe the output in channel-2 of the oscilloscope.

6. Connect the capacitor from your design in pre-lab in parallel with the resistance and observe the output only in DC mode of oscilloscope. Measure the lower VLP, and upper VUP, peak values.

Graph:

FIGURE NO.
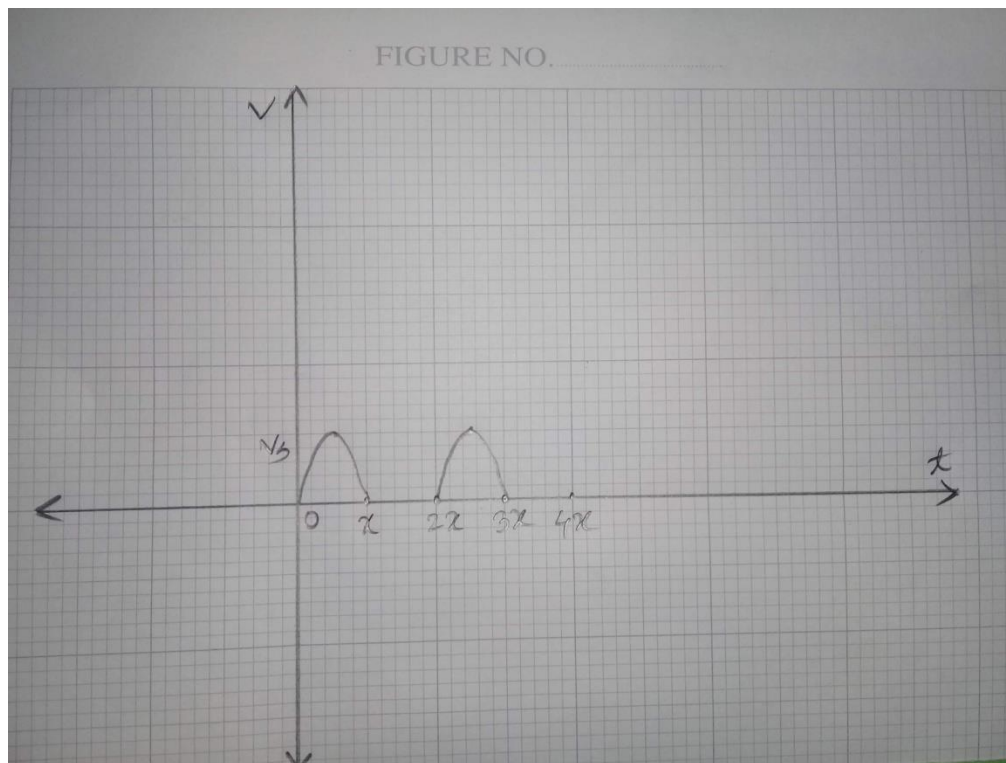
Half Wave Rectifier:

No. of Reading	Load Resistance RL (Ω)	Output Voltage (V0)		Ripple factor $r=\sqrt{\dfrac{Vrms\,2 - Vdc\,2}{Vdc\,2}}$
		V_{dc}	V_{rms}	
1	100	31.8	50	1.21
2	500	159	250	1.21
3	1K	318	500	1.21

Discussion: In this experiment we are going to see how an half wave rectifier allows only one half cycle of AC voltage wave form to pass while blocking the other half cycle. When current starts to flow through a half wave rectifier, for the positive half cycle of the AC source voltage the diode becomes forward biased and current can flow through it and the circuit becomes a closed circuit. For the negative half cycle of the AC source voltage, the diode becomes reverse bias and the circuit becomes open circuit so no current is able to pass through it.