Objectives :

1. Recording the output voltage for an Ohmic load resistance.
2. Representing the output voltage as a function of the load resistor.
3. Calculating and drawing the DC output voltages of half-wave rectifiers.

Theory :

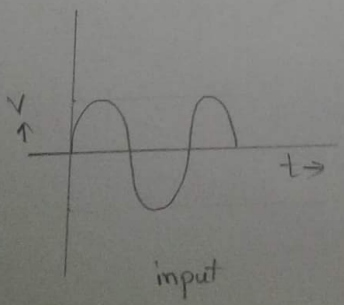
Rectifiers

A rectifier is an electrical device that converts alternating (AC) current to direct current (DC), a process known as rectificat Rectifiers have many uses including as components of power supplies and as detectors of radio signals. Rectifiers may be made of solid state diodes, vacume tube diodes, mercury arc valves and other components.

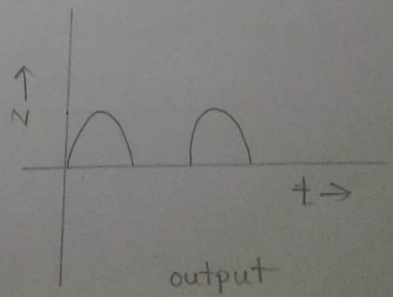
Half-wave rectification

In half wave rectification, either the positive or the negative half of the AC wave is passed, while the other half is blocked. As in this method, only half of the wave is rectified, so the component used to rectify the wave is called half wave rectifier.

Half wave rectification is very inefficient if used for power transfer, because only one half of the input waveform reaches the output. Half-wave rectification can be achieved with a single diode in a one-phase supply.



input



output

Apparatus :

Instruments

1. Voltage Generator
2. Multi-meter
3. Oscilloscope

Components

1. Diode : Silicon
2. Resistor : 1 kΩ

Working Diagram :

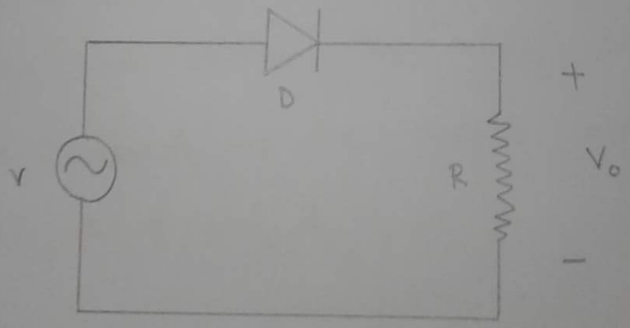


Fig : Circuit of half-wave rectification.

Working Procedure:

1. Construct the circuit, setting the supply voltage V with the frequency of 2k Hz. Put the oscilloscope probes at voltage generator and sketch the input waveform obtained.

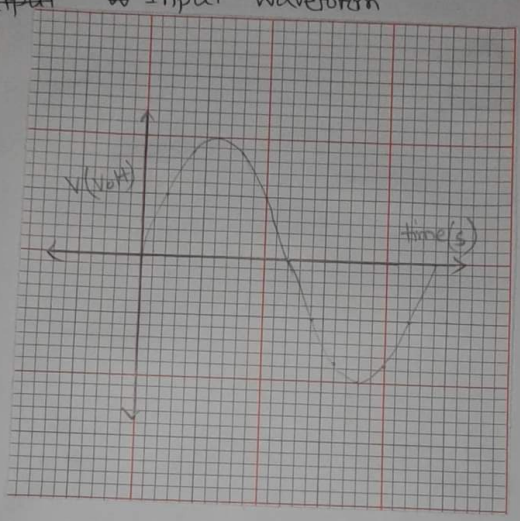
2. Put the oscilloscope probes across the resistor and sketch the output waveform obtained.

3. Reverse the diode of circuit of drawn figure. Now, sketch the output waveform.

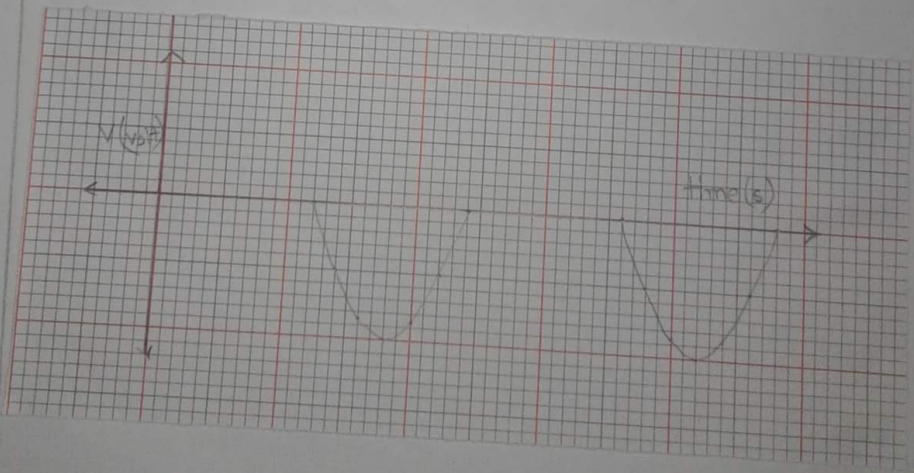
4. Comment on the results obtained from step 2 and 3.

Reverse Bias Diode

3. ~~Output~~ w Input waveform



4. Output waveform



Discussion:

From this lab we know how to build a half wave rectifier circuit. For building we must choose a diode that can safely withstand the current the circuit will have to provide, and also the reverse bias voltage that will be applied to it. Diodes are rated for maximum average forward current, which, since the diode conducts only half the time, is roughly $\frac{1}{2}\left(\frac{V_{av}}{R_L}\right)$, where V_{av} is the average voltage and R_L is the load resistance. The peak inverse voltage (PIV) is the maximum reverse bias that the diode can withstand. For the unfiltered rectifier, this is just the peak voltage.

The half wave rectifier is used most often in low-power applications because of their major disadvantages being. The output

amplitude is less than the input amplitude, there is no output during either negative or positive half cycle. So, half the power is wasted and the output is pulsed DC resulting in excessive ripple. By performing this experiment we know all this stuff.

Precautions:

1. Connections should be verified before clicking run button.
2. The resistance to be chosen should be in KΩ range.
3. Best performance is being obtained within 50Hz to 1MHz.

References:

1. http://en.wikipedia.org/wiki/Rectifier
2. http://www.circuitstoday.com/half-wave-rectifiers
3. https://studylib.net/doc/half-wave-rectifiers