

# LAB #03-B

## Objectives

To calculate and draw the DC output voltages of full-wave rectifiers.

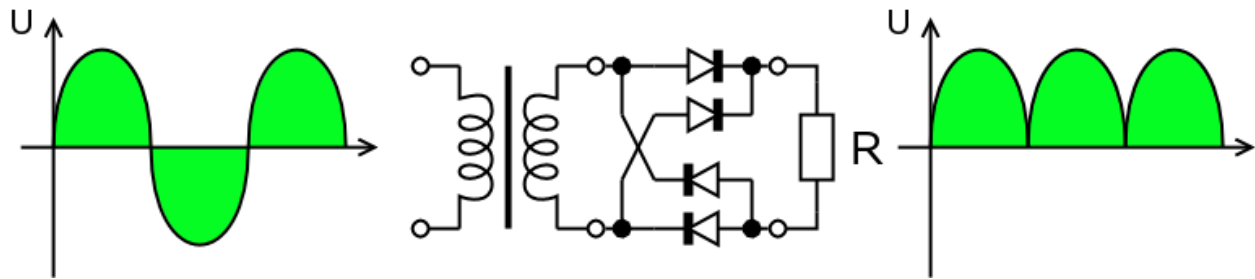
## Theory

### Rectifiers

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

### Full-wave rectification

A full-wave rectifier converts the whole of the input waveform to one of constant polarity (positive or negative) at its output. Full-wave rectification converts both polarities of the input waveform to DC (direct current), and is more efficient. However, in a circuit with a non-center tapped transformer, four diodes are required instead of the one needed for half-wave rectification. (See semiconductors, diode). Four diodes arranged this way are called a diode bridge or bridge rectifier:



## Preparatory Exercise

Q1) What is full wave rectifier?

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Q2) What are the two schemes of full wave rectifier?

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Q3) What are the advantages of bridge rectifier over center tap rectifier?

Q4) What are the advantages of bridge rectifier over center tap rectifier?

## Requirement

### Instruments

1. Center Tap Transformer/ Function Generator
2. Digital Multi-meter (DMM)
3. Oscilloscope

### Components

1. 4 Diodes : Silicon (D1N4002)
2. Resistors: 2.2k $\Omega$ , 3.3k $\Omega$

## Procedure

### **Full-Wave Rectification**

1. Construct the circuit of *Fig. 3.2*. Set the supply to 6 V p-p with the frequency of 60 Hz. Put the oscilloscope probes at function generator (trainer board) and sketch the input waveform obtained.
2. Put the oscilloscope probes across the resistor and sketch the output waveform obtained. Measure and record the DC level of the output voltage using the DMM.

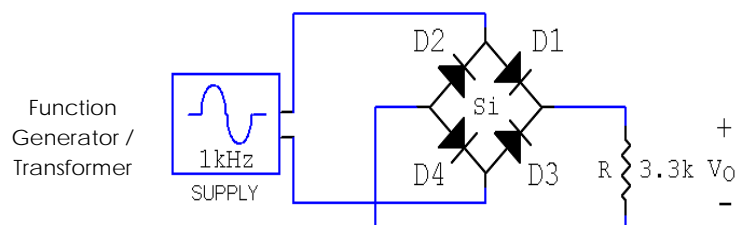


Fig. 3.2

3. Replace diodes  $D_3$  and  $D_4$  of circuit of *Fig. 3.2* by  $2.2\text{ k}\Omega$ . Draw the output waveform across the resistor. Measure and record the DC level of the output voltage.
4. What is the major effect of replacing the two diodes ( $D_3$  and  $D_4$ ) with resistors?

## Observation

### Results and Calculations

1. Input waveform,  $V_i$

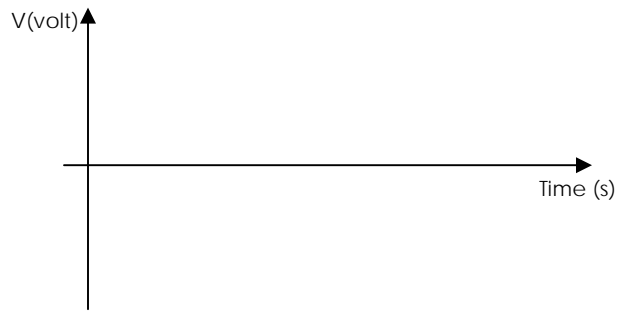


2. Output waveform,  $V_o$



DC level of  $V_o$  (measured) = \_\_\_\_\_

3. Diodes replaced with resistors

Output waveform,  $V_o$ DC level of  $V_o$  (measured) = \_\_\_\_\_