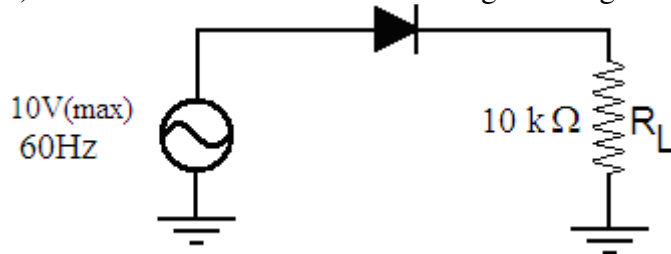


Electronics Lab

Rectifiers

Experiment 1: *Half wave rectifier.*

a) Connect the circuit shown in the figure using a silicon diode (like the 1N4148):



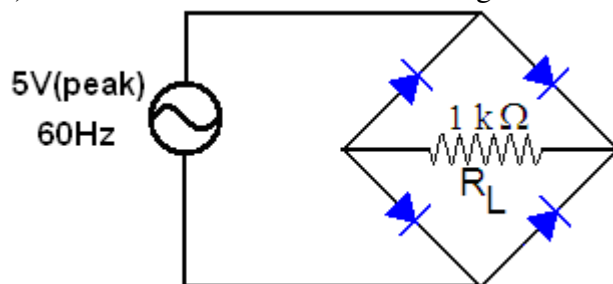
b) Calculate (using the second approximation for the diode) and measure the voltage across the load resistor. You can measure the DC value with the multimeter. When measuring in the AC mode, the value read will depend on how the instrument handles non-sinusoidal signals, for example it could read the RMS value or only the ripple (check this in the instrument manual).

c) Connect the oscilloscope so channel 1 shows the source voltage and channel 2 the load voltage. Describe in your notes what you see (sketch the waveform, note the maximum value, the period, and any other detail).

d) Repeat the experiment for other diode (germanium or LED).

Experiment 2: *Full wave rectifier.*

a) Connect the circuit shown in the figure:



b) Calculate (using the second approximation for the diode) and measure the voltage across the load resistor, both the DC value and the RMS value.

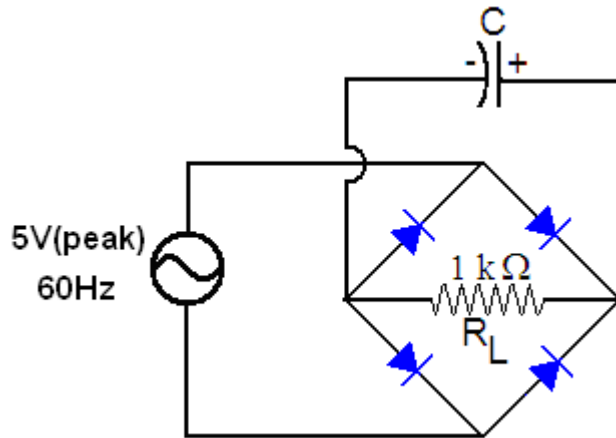
c) Connect the oscilloscope so channel 1 shows the source voltage, describe what you see in your notebook. Then connect channel 1 to see the load voltage. Describe in your notes what you see. Notice that you cannot show both signals at the same time.

d) Repeat the experiment with LEDs instead of silicon diodes.

Note: If you reduce the frequency, you will see the conducting diodes switching on/off.

Experiment 3: Capacitor filter.

a) Add a $47\mu\text{F}$ capacitor to the full wave rectifier circuit as shown below:
Be careful with the polarity!



b) Measure the DC and RMS load voltage. Compare to what you expected.

c) Connect the oscilloscope so channel 1 shows the load voltage. Describe in your notes what you see. [In order to see the ripple you might need to switch to AC-coupling and increase the amplification of the oscilloscope].

d) Repeat the experiment with a $1\mu\text{F}$ capacitor.