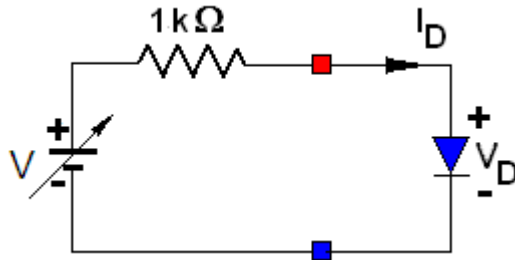# Electronics Lab

Diodes

Experiment 1: I-V curve for a diode

a) Connect the following circuit using an LED or a small signal diode:

b) Record the diode current and voltage for source voltages from 0 to 15V in steps of 0.5V. To measure current you can use a multimeter or an ammeter (be sure to connect it in series and use an appropriate scale).

c) Reverse the voltage source and take values of diode current and voltage from 0 to 15V again.

d) Plot the data taken in steps (b) and (c) to get the I-V curve of the diode, and determine the "knee" voltage from the graph.

Experiment 2: Forward bias, second approximation:

a) Replace the resistor in the circuit above with R=220Ω and set the source voltage to 5V. Calculate and measure the diode current using the second approximation (use the knee voltage determined above).

b) Connect the following circuit and calculate and measure the voltage across the 100kΩ resistor:
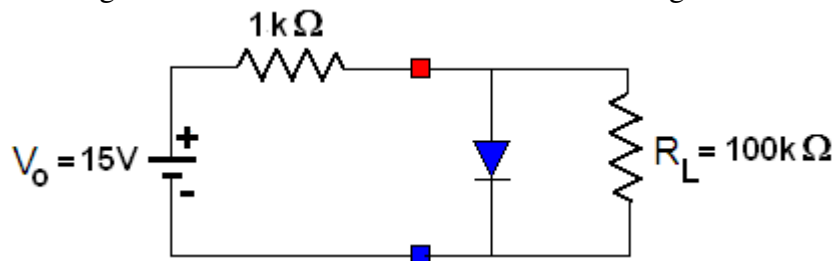

c) Predict what the voltage would be if you disconnect one end of the diode. Then check if your prediction is correct.

d) Predict what the voltage would be if you the diode is shorted. Then use a jumper to short the diode and confirm.

# Experiment 3: Thevenin equivalent and second approximation

a) Using the first and second approximation for the diode calculate the current in the following circuit. To be more accurate do not use the nominal value of the resistors, but their actual value measured with the multimeter.
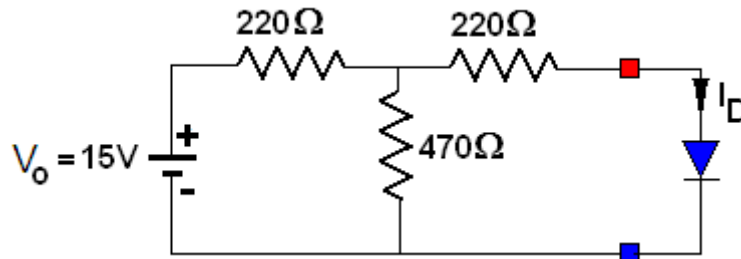
b) Connect the circuit and measure the current. Calculate the errors with respect to your approximations.

Experiment 4: Observation of diode curve in oscilloscope.

We will use a circuit similar to the one of the first experiment, but the voltage source will be replaced by the signal generator. Select the saw-tooth waveform and make sure you have a range of -10 to +10 volts at least. Connect the circuit as follows:
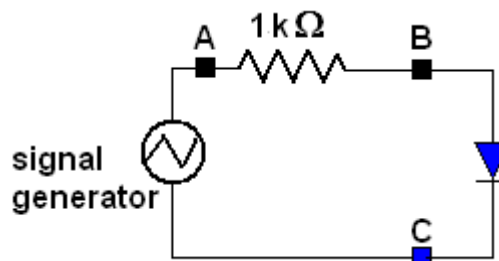
Connect channels 1 and 2 of the oscilloscope to the resistor and the diode. Use point B in the circuit as the common point. Then select the X-Y display in the oscilloscope. This way the voltage across the resistor, which is proportional to the current will be the y-axis and the signal from the diode voltage will be the x-axis.

Can you determine the knee voltage from the curve? What about the resistance of the diode in the forward direction (third approximation)? Try to get an estimate of the forward resistance.