University of Anbar
College of Engineering
Dept. of Electrical Engineering

Lab. Name: Electronic I
Experiment no.: 2
Lab. Supervisor: Munther N. Thiyab

# Experiment #2- Part#2

## Diode Charstristics

## Procedure

1. Connect the diode circuit shown in Fig.3.

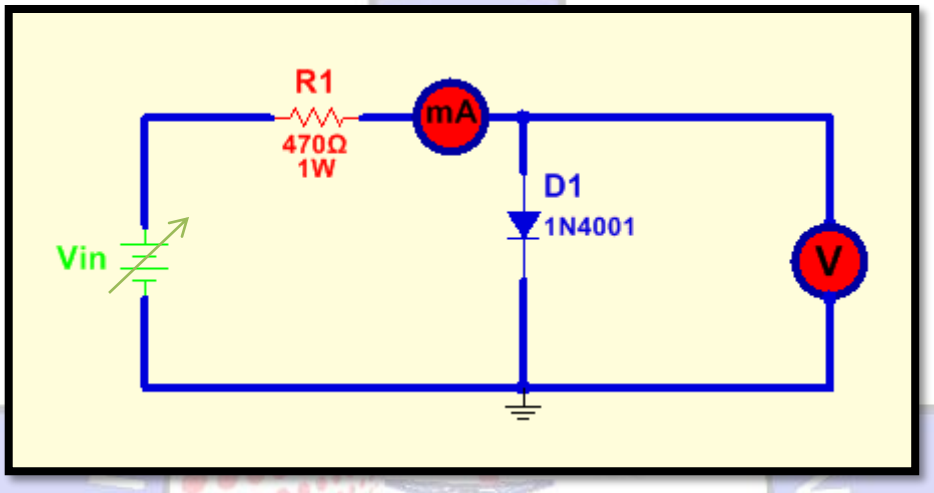



Figure 3: Diode Forward-Biased Circuit

2. Set the DC supply voltage $V_{in}$ at 0V, and increase it gradually. Record diode voltage $V_D$ and current $I_D$ in each step according to Table 1 below.

Table 1: Recorded Data for the Forward-Biased Diode Circuit

| $I_D$(mA) | $V_D$(V) |
|---|---|
| 0 | |
| 0.5 | |
| 1 | |
| 2 | |
| 6 | |
| 10 | |

| | |
|---|---|
| 12 | |
| 18 | |
| 20 | |
| 22 | |

3. Connect the reverse-biased diode circuit shown in Fig.4. Set the DC power supply voltage $V_{in}$ at 0V, and increase it gradually in several steps and record diode reverse voltage $V_R$ and reverse current $I_R$ as indicated in Table 2.below.

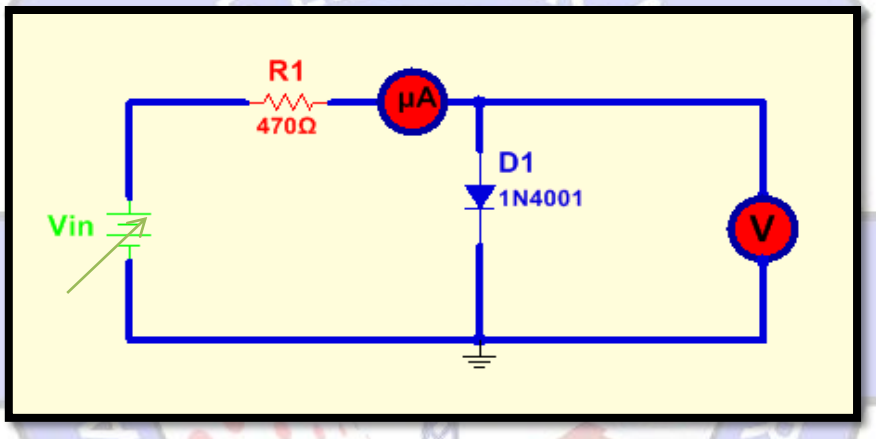
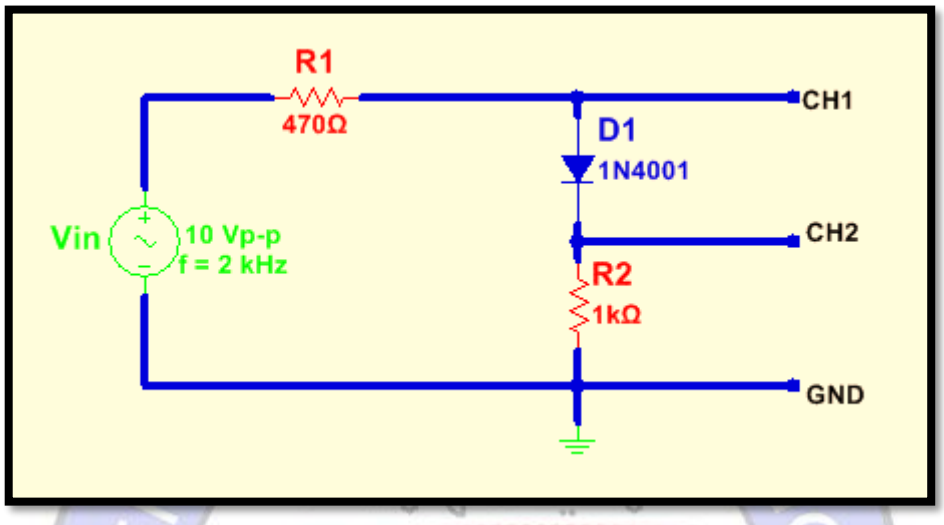



Figure 4: Diode Reverse-Biased Circuit

Table 2: Recorded Data for the Reverse-Biased Circuit

| $V_R$(V) | $I_R$(μA) |
|---|---|
| 0 | |
| 5 | |
| 10 | |
| 15 | |
| 20 | |
| 25 | |

4. Connect the circuit shown in Fig.5 to display the diode characteristics on the oscilloscope. Set the oscilloscope in the X-Y mode and vary the vertical and horizontal sensitivities of the oscilloscope to obtain the proper display.




Sketch the resulting characteristic curve. Record the voltage scale for channel 1 (X-channel), and channel 2 (Y-channel) after fixing the scope in the X-Y mode. The X-channel represents the diode voltage, and the Y-channel represents the diode current with the current scale obtained as:

$$Current\ sensitivity = \frac{Voltage\ sensitivity}{10\Omega}$$

## Calculations and Discussion

1. Plot the diode forward characteristics from the results obtained, and determine the cut in voltage Vγ from the sketch.
2. From the sketched characteristic curve determine the static resistance of the diode $R_{DC}$
3. at $I_{DQ}$ = 10mA. Determine also the diode dynamic resistance at $I_{DQ}$ = 10mA, and compare it with the theoretical value obtained from the equation.

4. Plot the diode reverse characteristic, and estimate an approximate value for the reverse saturation current IS. From the results obtained in this experiment, compute the maximum power dissipated in the diode.
5. Explain how you could use an ohmmeter to identify the cathode of an unmarked diode.
6. Explain why a series resistor is necessary when a diode is forward-biased.
7. In a certain silicon diode, it was found that the diode current is 15mA when the diode voltage is 0.64V at room temperature. Determine the diode current when the voltage across it becomes 0.68V. Use the approximate diode characteristic equation.
8. From the approximate diode characteristic equation, derive an expression for the dynamic resistance rd.