EE236: Experiment No. 10
Silicon Controlled Rectifier

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1 Overview of the experiment

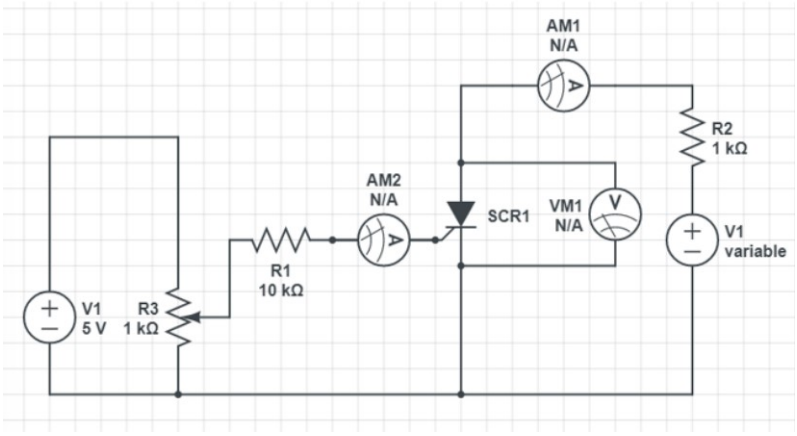
1.1 Aim of the experiment

- To obtain I-V characteristics of SCR
- To vary the gate currents and plot the I-V characteristics for different gate currents.
- To control the phase angle of a sinusoidal signal using SCR

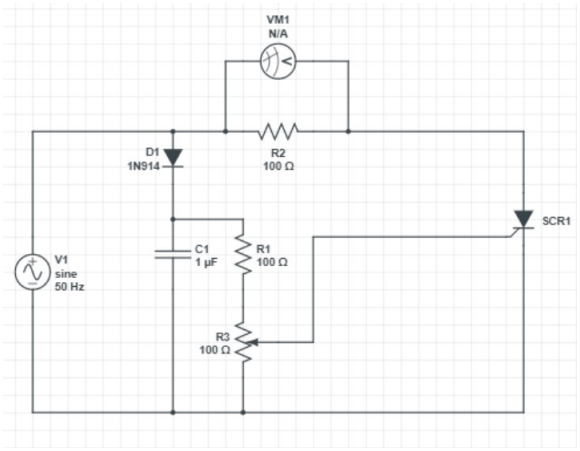
2 Lab Experiment

2.1 Circuits Used

2.1.1 Circuit for SCR I-V Characteristics



2.1.2 Circuit for Phase Control using SCR



2.2 Obtained IV Characteristic Readings

2.2.1 For Gate Current of 1 μA for $10V \leq V_{input} \leq 20V$

V_{input} (V)	I_D(mA)	V_{ak}(V)
10	9.27	0.746
10.5	9.8	0.749
11	10.3	0.752
11.5	10.86	0.754
12	11.35	0.757
12.5	11.87	0.759
13	12.3	0.761
13.5	12.86	0.763
14	13.38	0.765
14.5	13.85	0.768
15	14.4	0.77
15.5	14.9	0.771
16	15.47	0.773
16.5	15.99	0.775
17	16.45	0.776
17.5	16.96	0.778
18	17.46	0.78
18.5	18.02	0.781
19	18.5	0.783
19.5	19.02	0.785
20	19.58	0.786

2.2.2 For Gate Current of 4 μA for $10V \leq V_{input} \leq 20V$

V_{input} (V)	I_D(mA)	V_{ak}(V)
10	9.35	0.747
10.5	9.82	0.75
11	10.34	0.753
11.5	10.78	0.755
12	11.29	0.757
12.5	11.86	0.76
13	12.29	0.762
13.5	12.85	0.764
14	13.32	0.766
14.5	13.9	0.768
15	14.4	0.77
15.5	14.9	0.772
16	15.41	0.773
16.5	15.88	0.775
17	16.51	0.777
17.5	16.99	0.779
18	17.46	0.78
18.5	18.09	0.782
19	18.53	0.784
19.5	19.07	0.785
20	19.45	0.787

2.2.3 For Gate Current of 7 μA for $10V \leq V_{input} \leq 20V$

V_{input} (V)	I_D(mA)	V_{ak}(V)
10	9.3	0.746
10.5	9.85	0.749
11	10.3	0.752
11.5	10.8	0.754
12	11.32	0.757
12.5	11.78	0.759
13	12.3	0.762
13.5	12.87	0.763
14	13.33	0.765
14.5	13.92	0.769
15	14.36	0.77
15.5	14.93	0.771
16	15.43	0.773
16.5	15.98	0.775
17	16.37	0.776
17.5	16.97	0.778
18	17.48	0.78
18.5	17.9	0.781
19	18.6	0.783
19.5	19.09	0.785
20	19.66	0.786

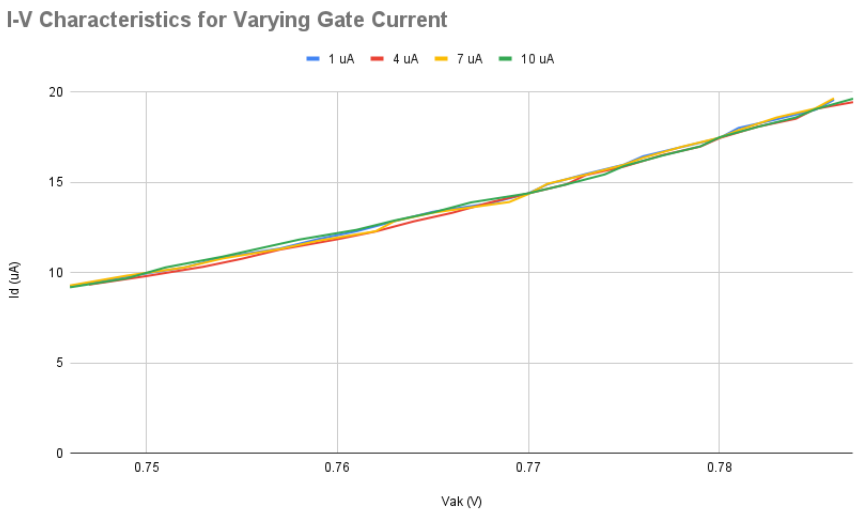
2.2.4 For Gate Current of 10 μA for $10V \leq V_{input} \leq 20V$

V_{input} (V)	I_D(mA)	V_{ak}(V)
10	9.2	0.746
10.5	9.7	0.749
11	10.3	0.751
11.5	10.9	0.754
12	11.37	0.756
12.5	11.84	0.758
13	12.38	0.761
13.5	12.9	0.763
14	13.34	0.765
14.5	13.9	0.767
15	14.4	0.77
15.5	14.9	0.772
16	15.45	0.774
16.5	15.91	0.775
17	16.49	0.777
17.5	17	0.779
18	17.5	0.78
18.5	18.08	0.782
19	18.6	0.784
19.5	19.05	0.785
20	19.64	0.787

2.2.5 For $0V \leq V_{input} \leq 10V$ Independent of Gate Current

V_{input} (V)	I_D(mA)	V_{ak}(V)
10	0	0.074
10.5	0	0.519
11	0	0.997
11.5	0	1.5
12	0	2.01
12.5	0	2.5
13	0	2.96
13.5	0	3.58
14	0	4.02
14.5	0	4.61
15	0	5.06
15.5	0	5.55
16	0	6.06
16.5	0	6.51
17	0	7.06
17.5	0	7.64
18	0	8.12
18.5	0	8.65
19	0	9.14
19.5	0	9.57
20	0	10.11

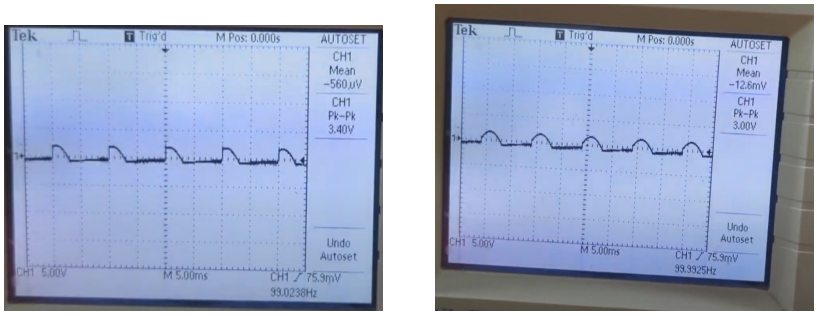
2.2.6 Plot Obtained for $10V \leq V_{input} \leq 20V$



Thus we see that, IV characteristics are nearly linear when $V_{input} > 10V$. If $V_{input} < 10V$. The output current is nearly 0 and the SCR doesn't conduct.

3 Phase Control using SCR

The circuit was connected and the outputs obtained on oscilloscope as follows



(a) Non Zero Firing Angle (b) Nearly Zero Firing Angle

Figure 1: Output Obtained on the Oscilloscope