Experiment 1
Study of ideal diode as a Half Wave Rectifier.

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Aim

- To measure the ripple factor of a half wave rectifier with changing the input voltage.
- To measure the ripple factor of a half wave rectifier with capacitor filter for different capacitance values and comparing theoretical and experimental peak to peak ripple voltage.

Formulae

- $V_{RMS} = \sqrt{2}V$
- Ripple factor $\gamma = \sqrt{V_{RMS}^2/V_{DC}^2 - 1}$
- Ripple Voltage $V_\gamma = \frac{V_{AC,RMS}}{RCf}$

Results and Analysis

Part B.1: Half Wave Rectifier

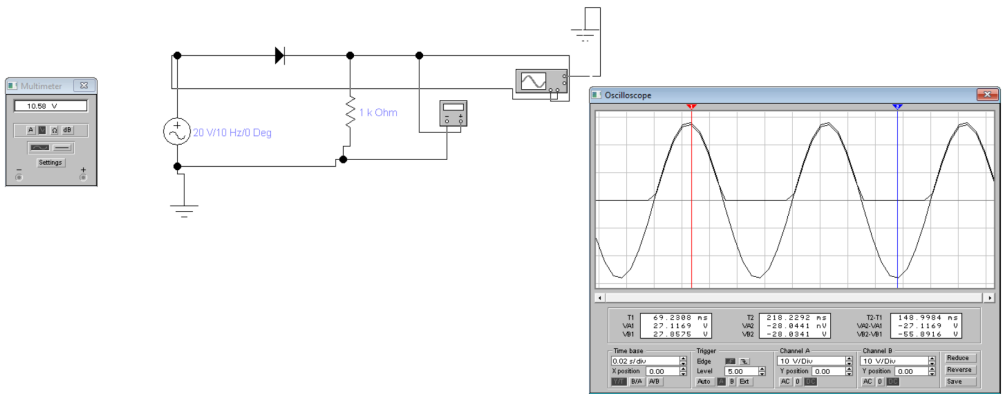

Figure 1: Half Wave Rectifier

$V_{in,AC}$ 10Hz	V_{out} DC	V_{out} AC	γ ripple factor V_{ac}/V_{dc}
20	8.47	10.33	1.21959
24	10.19	12.41	1.21786
28	11.84	14.36	1.21283
30	12.87	15.68	1.21833
34	14.67	17.88	1.21881

Part B.2: Half wave rectifier with capacitance

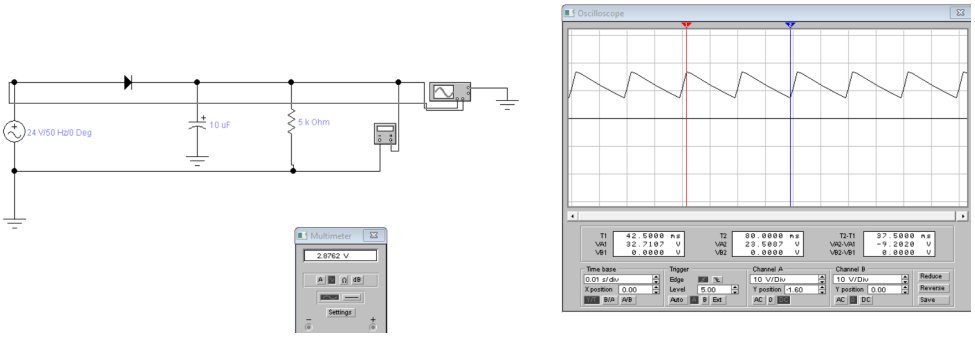

Figure 2: $10\mu F$

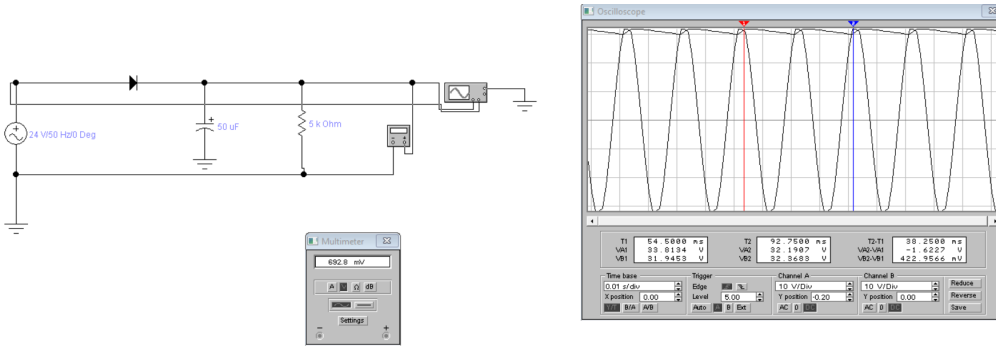

Figure 3: $50\mu F$

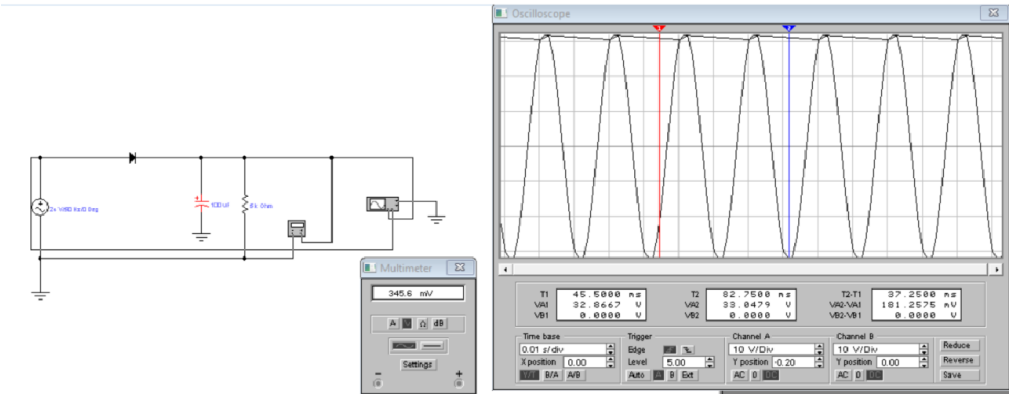

Figure 4: $100\mu F$

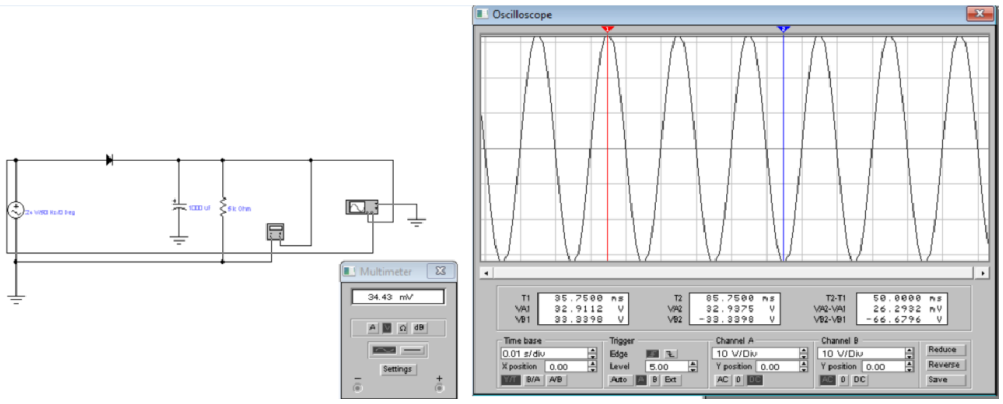

Figure 5: $1000\mu F$

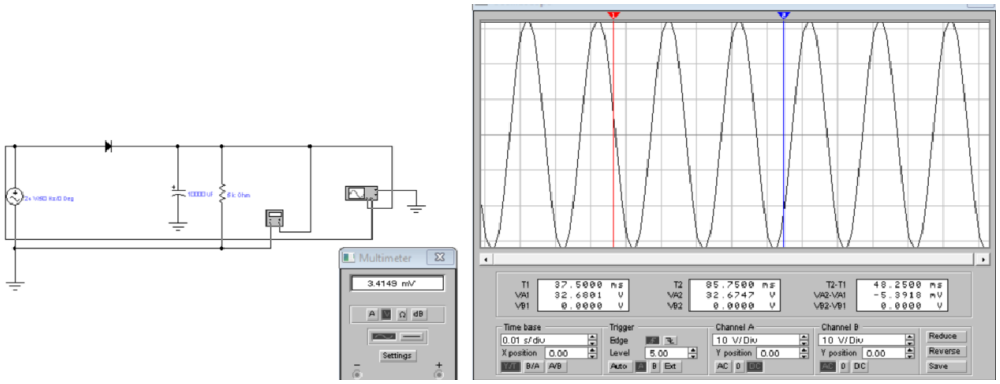

Figure 6: $10000\mu F$

Capacitance (μF)	$V_{in,AC,RMS}$ 50 HZ	$V_{out,DC}$	$V_{out,AC}$	Ripple Voltage (ex) Peak to Peak	Ripple Voltage (theo) Peak to peak	Ripple factor γ
10	24	28.11	2.8762	9.202	13.576	0.1022
50	24	33.1	0.692	2.206	2.7183	0.0209
100	24	33.08	0.354	1.0634	1.3576	0.0107
1000	24	32.93	0.0344	0.11538	0.1357	0.00105
10000	24	32.68	0.003418	0.11423	0.0136	0.000104

Conclusion

The theoretical value of ripple factor γ is 1.21 and the data above shows that the ones ripple factor obtained by the software are in good agreement with the theoretical one.
The ripple factor decreased significantly after we added the capacitor filter. And it decreases with increasing capacitance. The theoretical and experimental values of ripple voltage are in good agreement with a bit of an error.