Basic DC Power Supply

Equipment:

1. Oscilloscope
2. Digital multimeter
3. Experimental board and connectors.

Objectives:

1. To understand the basic DC power supply both half wave and full wave rectifier.
2. To understand the filter and the regulator circuit.
3. To understand the effect of load.

<u>Cautions</u> This is power supply lab. Lot of power will be delivered to Load (RL) via diode. These components will become very HOT. Don't touch them.

1. Half Wave Rectifier Circuit

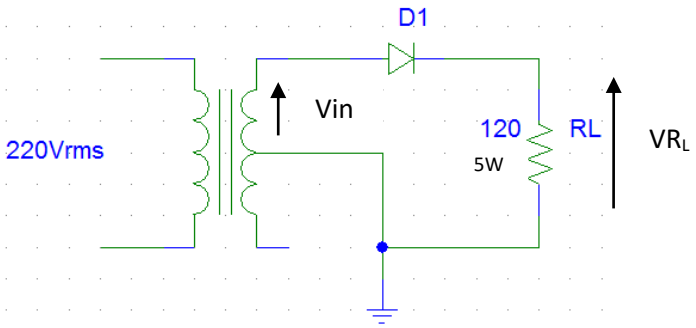

Fig.1

Calculate voltage across load (R_L), average voltage, average current and peak inverse voltage and plot the voltage across load (R_L)

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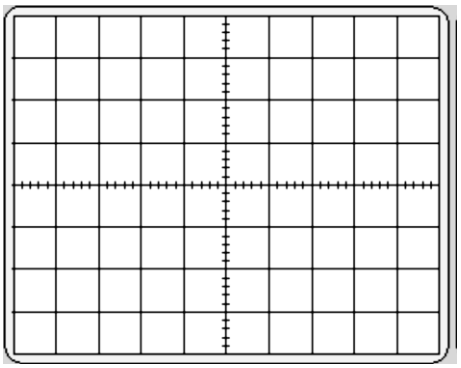
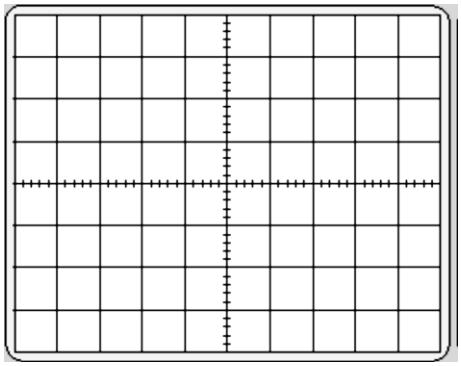
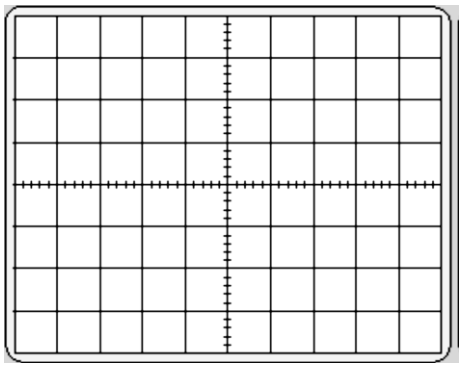


VR_L Volt/Div_____ Time/Div_____

Build the circuit as shown in Fig.1 and use oscilloscope to measure and record waveforms.



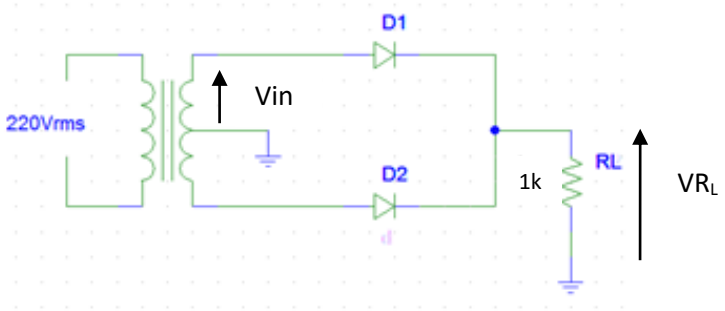
V_{in} Volt/Div_____ Time/Div_____



VR_L Volt/Div_____ Time/Div_____

Measure the voltage across load (R_L) with digital multimeter (DC mode) = _____ Volt.

2. Center Tapped Full wave rectifier circuit



Calculate voltage across load (R_L), average voltage, average current and peak inverse voltage and plot the voltage across load (R_L)

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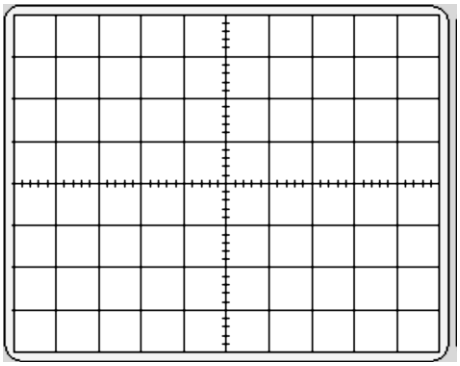
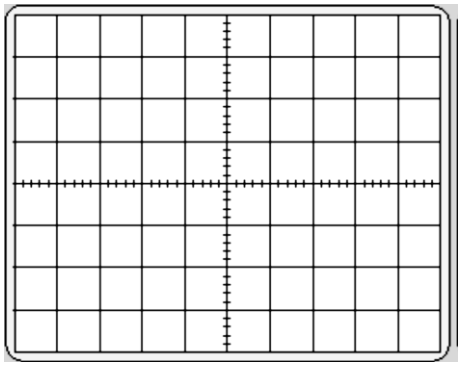
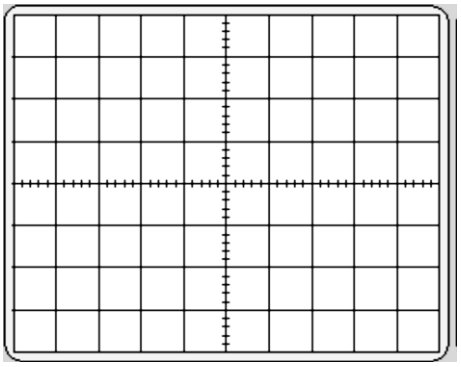


VR_L Volt/Div_____ Time/Div_____

Build the circuit and use oscilloscope to record waveforms.



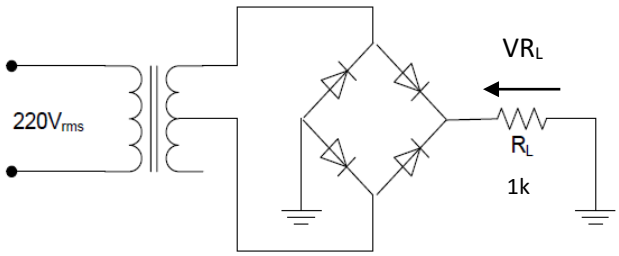
V_{in} Volt/Div_____ Time/Div_____



VR_L Volt/Div_____ Time/Div_____

Measure the voltage across load (R_L) with digital multimeter (DC mode) = _____ Volt.

3. **Bridge Full wave rectifier circuit (Don't measure Vin)**



Calculate voltage across load (R_L), average voltage, average current and peak inverse voltage and plot the voltage across load (R_L)

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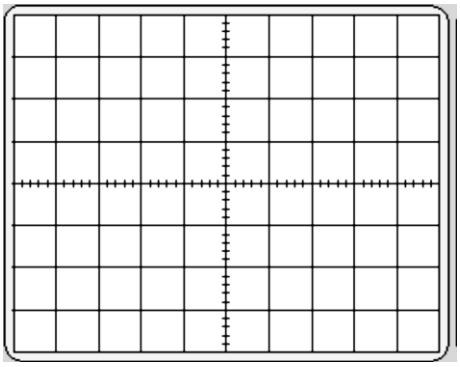
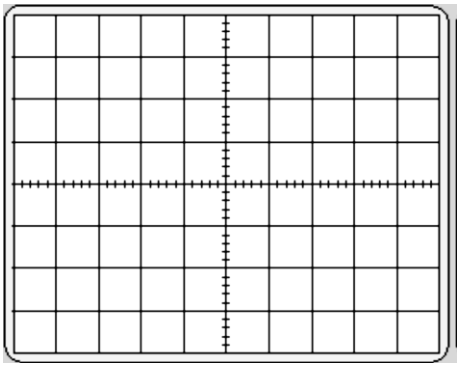


VR_L Volt/Div_____ Time/Div_____

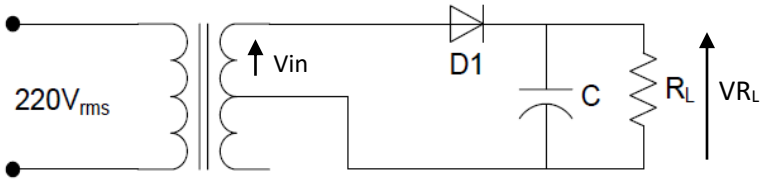
Build the circuit and use oscilloscope to record waveforms.



VR_L Volt/Div_____ Time/Div_____

Measure the voltage across load (R_L) with digital multimeter (DC mode) = _____ Volt.

4. Filter Circuit



Calculate average voltage, average current, ripple factor and ripple voltage and plot the voltage across R_L, using RL = 120Ω, C = 470μF

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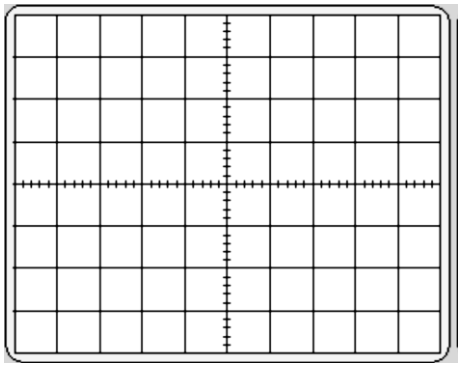
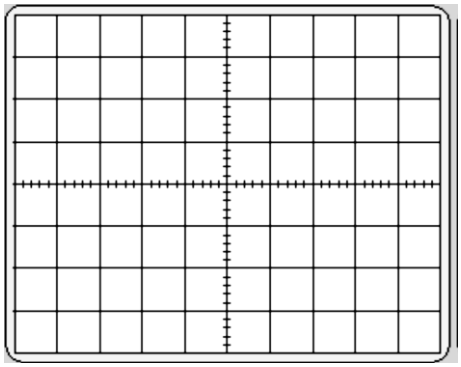
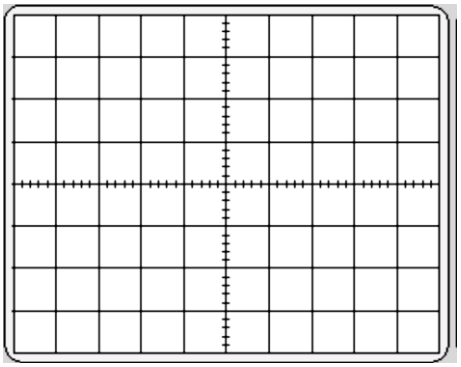


VR_L Volt/Div_____ Time/Div_____

Build the circuit and use oscilloscope to record waveforms.



V_{in} Volt/Div_____ Time/Div_____

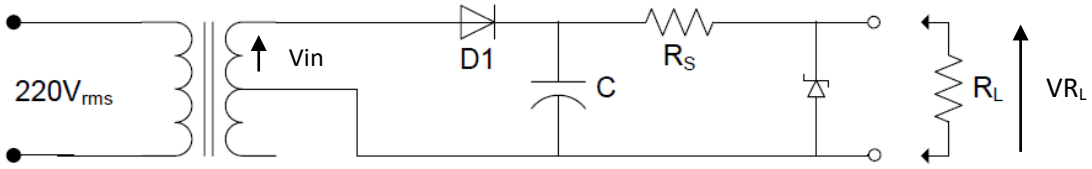


VR_L Volt/Div_____ Time/Div_____

Measure the voltage across load (R_L) with digital multimeter (DC mode) = _____ Volt.

5. Regulator Circuit using Zener Diode

From the circuit given below do the following



Calculate %load regulator and measure the voltage across zener diode by using multimeter and oscilloscope both with no load and with load, and plot related waveform.

- Using C=470μF, RS=150Ω(0.5 watt), RL=1kΩ

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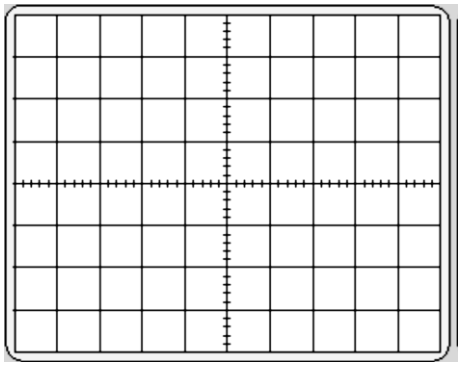
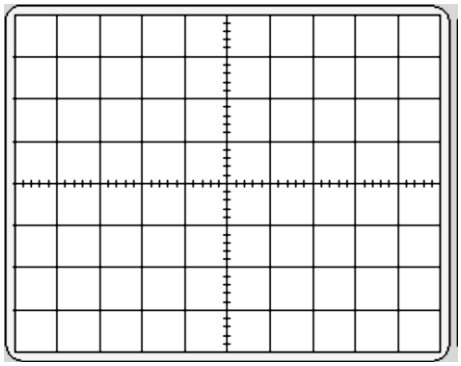
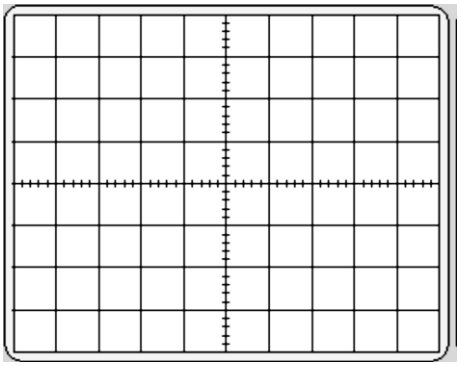


VR_L Volt/Div_____ Time/Div_____

Build the circuit and use oscilloscope to record waveforms.



V_{in} Volt/Div_____ Time/Div_____



VR_L Volt/Div_____ Time/Div_____

Measure the voltage across load (R_L) with digital multimeter (DC mode) = _____ Volt.

- Using C=470μF, RS=150Ω, RL=120Ω(5 Watt)

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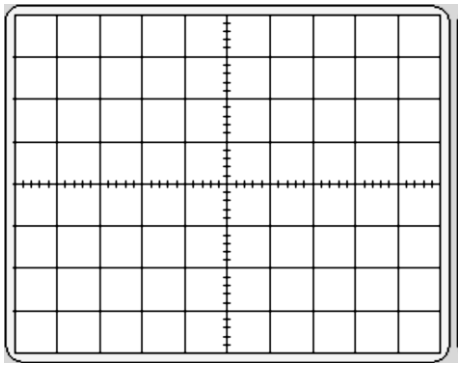
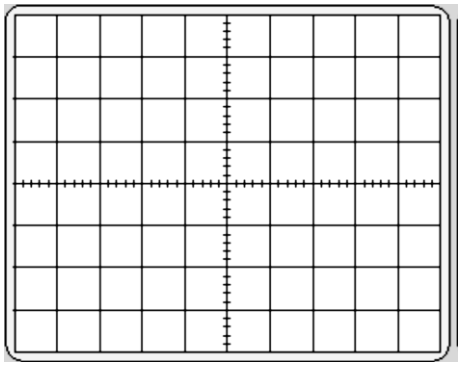
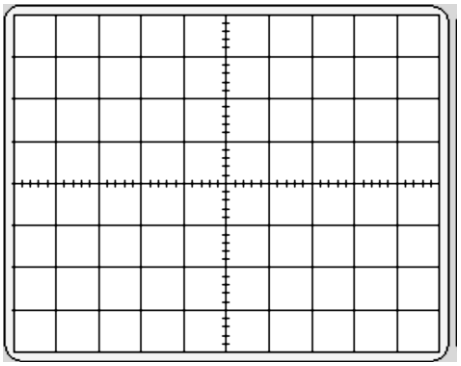


VR_L Volt/Div_____ Time/Div_____

Build the circuit and use oscilloscope to record waveforms.



V_{in} Volt/Div_____ Time/Div_____



VR_L Volt/Div_____ Time/Div_____

Measure the voltage across load (R_L) with digital multimeter (DC mode) = _____ Volt.

Revised by WL 28/10/2015

Lab Question: Determine the ripple factor for the filtered bridge rectifier with a load as indicate in this figure and show the voltage waveforms across R_L. Assume the secondary voltage of transformer is 15 V(RMS).