Half and Full wave rectifier with filter
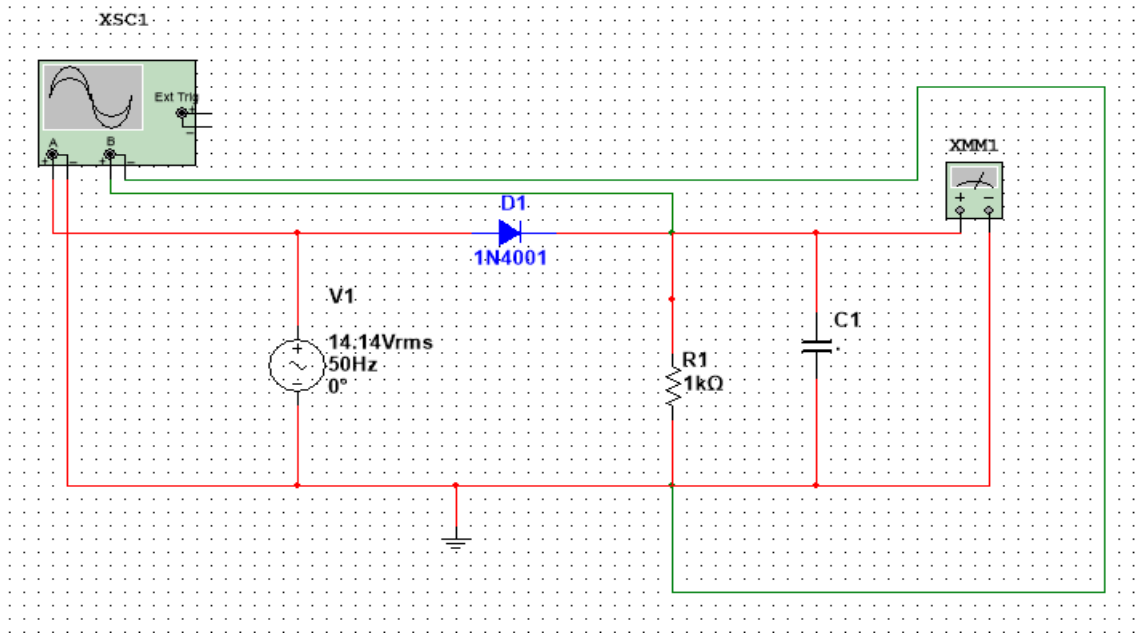
Theory: A rectifier is an electric device that converts alternating current (AC) to direct current (DC), a process known as rectification. In half wave rectification, either the positive or negative half of the AC wave is passed, while the other half is blocked. Because only one half of the input waveform reaches the output, it is very inefficient if used for power transfer. Half wave rectification can be achieved with a single diode in a one phase supply. In a half wave rectifier circuit, during the positive half-cycle of the input, the diode is forward biased and conducts. Current flows through the load and a voltage is developed across it. During the negative half-cycle, it is reverse biased and does not conduct. Therefore, in the negative half cycle of the supply, no current flows in the load resistor as no voltage appears across it. Thus, the dc voltage across the load is sinusoidal for the first half cycle only and a pure A.C. input signal is converted into a unidirectional pulsating output signal.

With filter, during the positive half cycle, the capacitor gets charged as well as the load supply. During the negative half cycle, the circuit is open during which the capacitor supplies the stored energy in it. The more the energy storage capacity the lesser the ripple in the output waveform.
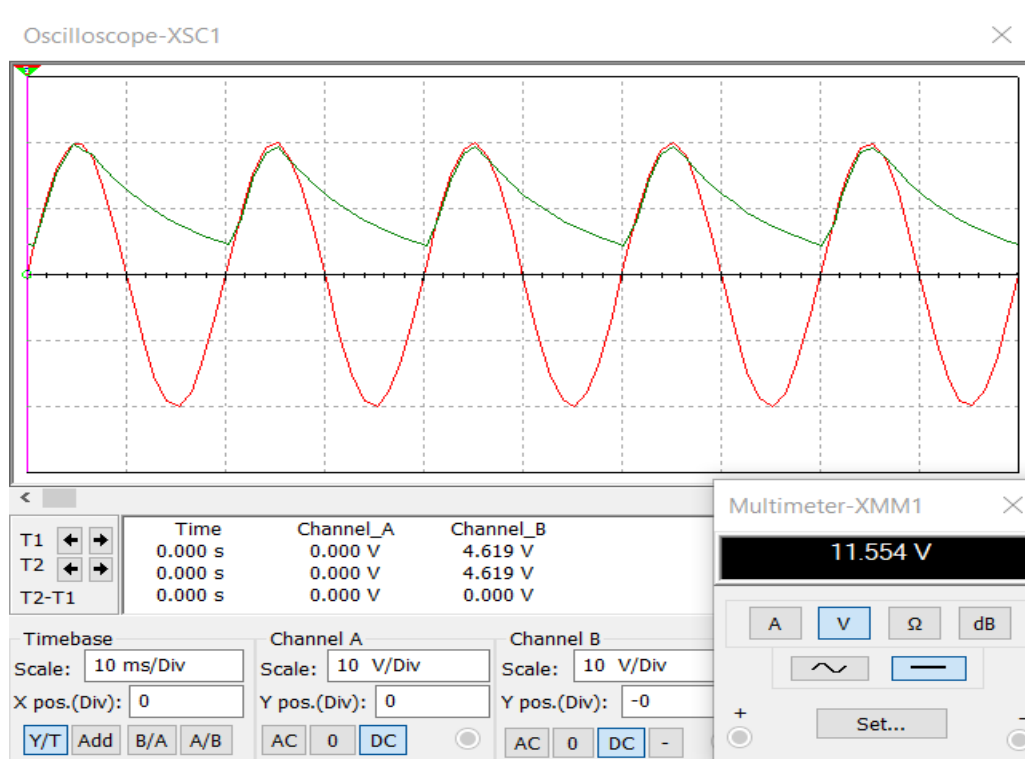
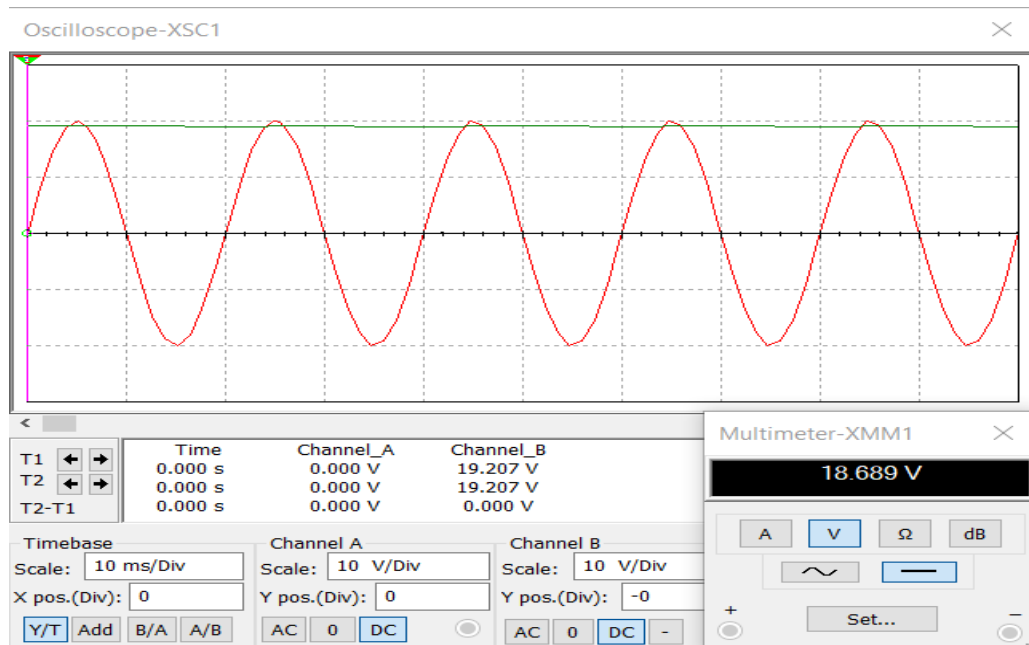## 1) Half Wave Rectifier with Filter:

Required Apparatus and Components:

1. Diode 1N4001(Si)
2. Resistor 1KΩ
3. Capacitor 10µF, 1000µF
4. A.C power source = (14.14 rms and 50 Hz)
5. Oscilloscope
6. Multimeter

Half Wave Rectifier with Filter
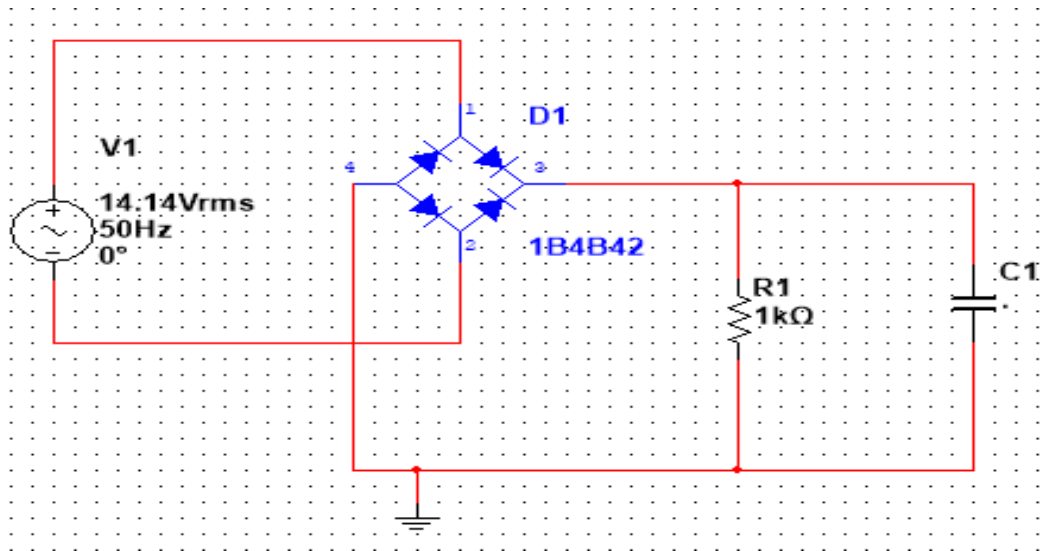
Input - Output Wave Shape with Filter, C = 10 μF

Input - Output Wave Shape with Filter, C = 1000 μF

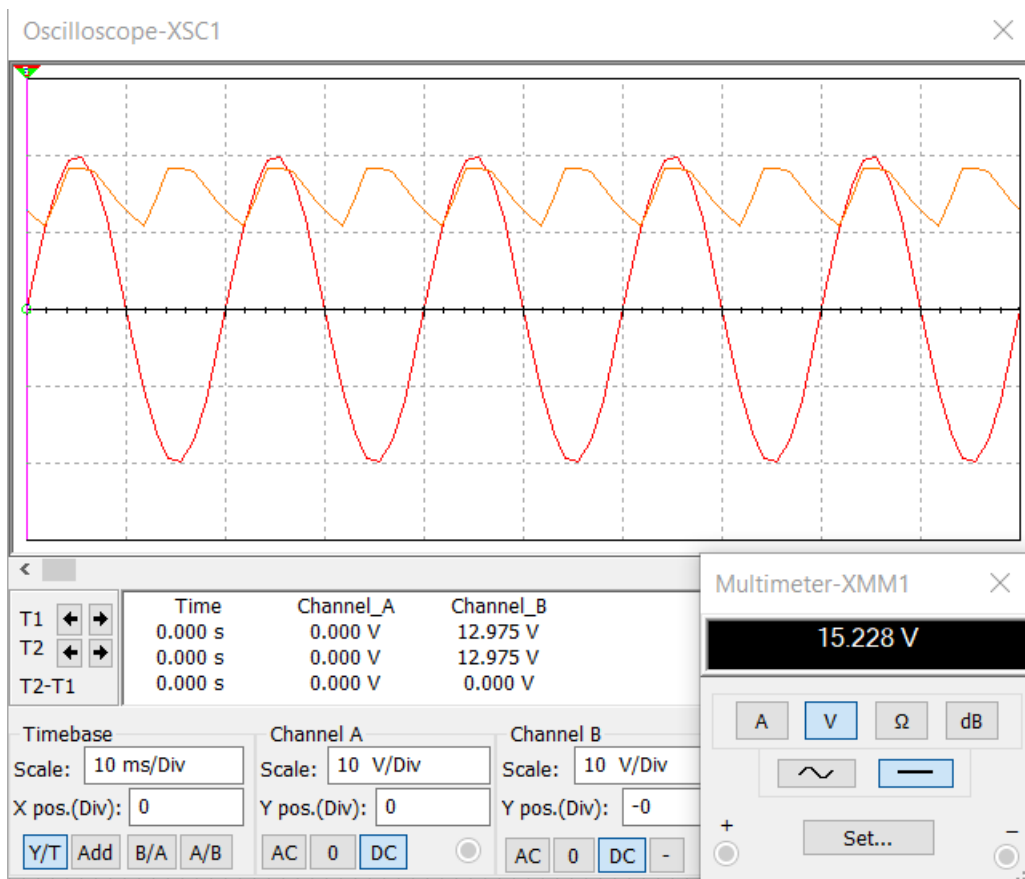## 2) Full Wave (Bridge) Rectifier with Filter:

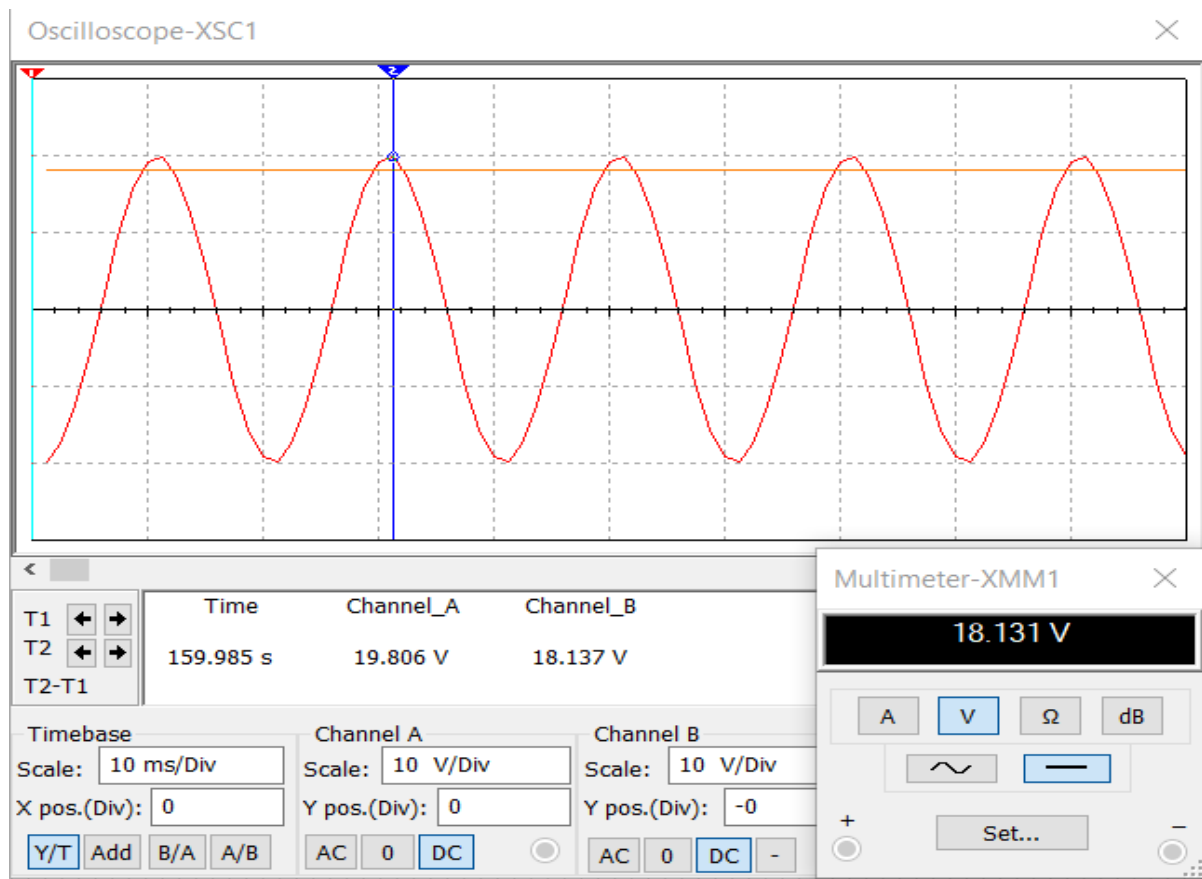Required Apparatus and Components:

1. Full Wave Bridge (FWB) type 1B4B42
2. Resistor 1KΩ
3. Capacitor 10μF, 1000μF
4. A.C power source = (14.14 rms and 50 Hz),
5. Oscilloscope
6. Multimeter

Full Wave Rectifier(Bridge) with Filter

Input - Output Wave Shape with Filter, C = 10 μF

Input - Output Wave Shape with Filter, C = 1000 µF

Discussion:

1. Explain the effect of increasing the filter capacitance on the output voltage in the half wave and Full wave rectifier.
2. Explain the effect of increasing the load of the circuit.