$$V_m - V_O = 0$$
$$\Rightarrow V_O = V_m$$
$$V_O - PIV + V_m$$
$$\Rightarrow PIV = 2V_m$$
$$PIV \geq 2Vm$$

Procedure

1. Set the resistor RL.
2. Click on 'ON' button to start the experiment.
3. Click on 'Sine Wave' button to generate input waveform
4. Click on 'Oscilloscope' button to get the rectified output.
5. Vary the Amplitude, Frequency, volt/div using the controllers.
6. Click on "Dual" button to observe both the waveform.
7. Channel 1 shows the input sine waveform, Channel 2 shows the output rectified waveform.
8. Calculate the Ripple Factor.Theoretical Ripple Factor= 0.483.

EXPERIMENT-5

Objective: To study the filter and evaluate the efficiency.

Apparatus required

Power supply

Lab trainer kit

Jumper wires

Oscilloscope

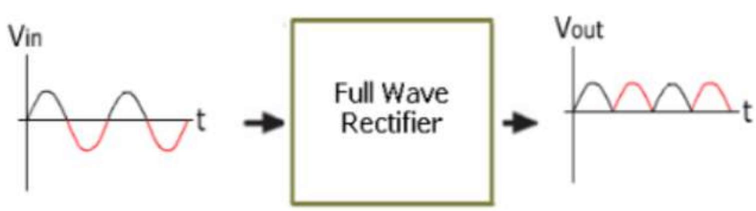
Waveform generator

Multimeter

Theory

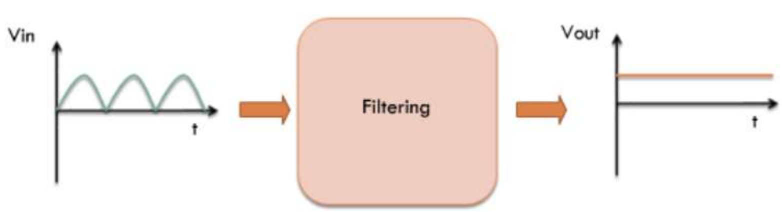
Rectifier

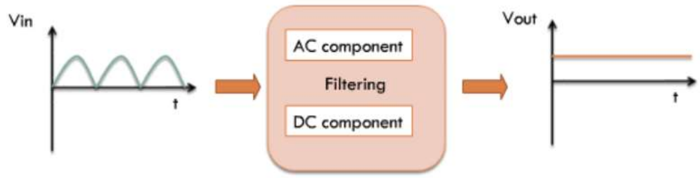
In our earlier experiment we have seen that a full-wave rectifier is exactly the same as the half-wave, but allows unidirectional current through the load during the entire sinusoidal cycle (as opposed to only half the cycle in the half-wave). A full-wave rectifier converts the whole of the input waveform to one of constant polarity (positive or negative) at its output.



Filter

What is really desired is to convert the pulsating output of the rectifier to a constant DC supply. Thus we would like to 'filter' the pulsating input signal.

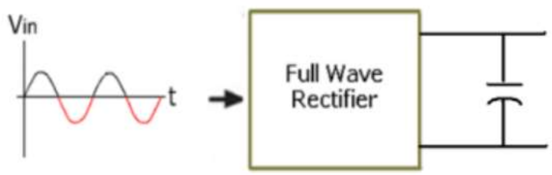




We can do this by splitting the input waveform into AC (high frequency) and the DC components (very low frequency) and by then 'rejecting' the high frequency components.

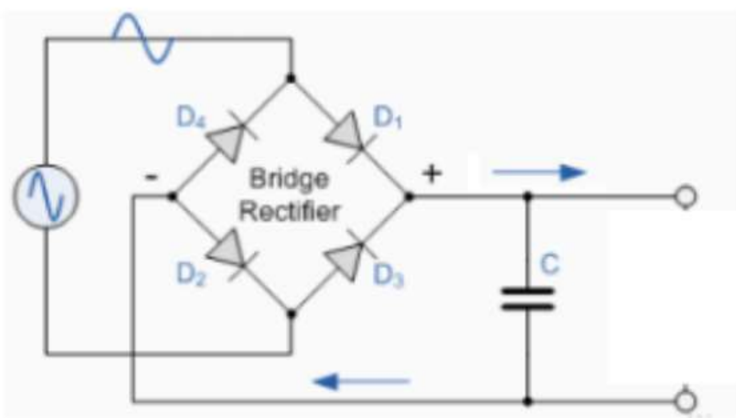
Filtering

From our filtering experiments we have seen that the simplest kind of filter that can perform the filtering task just described is a capacitor. Thus, if we connect a capacitor directly across the output of a rectifier, the AC components will 'see' a low impedance path to ground and will not, therefore appear in the output.



Full Wave Rectification + Filtering

The smoothing capacitor converts the full-wave rippled output of the rectifier into a smooth DC output voltage. The smoothing capacitor acts as a tank.



Ripple Voltage and Ripple Factor

Assuming a finite capacitor is connected, since a new charging pulse occurs every half cycle the capacitor charges and discharges very frequently. We can observe that smaller the Vpp, the more the waveform will resemble a pure DC voltage. The variable portion is known as 'ripple' and the value Vpp is known as the ripple voltage. Further the ratio of the ripple voltage to the DC or average voltage is known as the ripple factor.