Electronics Laborotary

By

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Experiment No.5

Half-wave rectifier with a capacitor-input filter

1. Objectives:

- Construct the half-wave rectifier circuit.
- Connect a capacitor input filter in parallel with the load resistor.
- Measure/plot the input and output waveform with and without C.
- Find the peak and average values of the output signal.

2. Components and equipment

- Function generator (representing the standard transformer)
- Two-channel Oscilloscope.
- Multimeter
- Breadboard, Semiconductor diode, 100µF capacitor, and a variable resistor.

3. Theory

The half-wave rectifier is used in this experiment to illustrate the filtering principle; then, the concept is expanded to the full-wave rectifier.

During the positive first quarter-cycle of the input, the diode is forward-biased, allowing the capacitor to charge to approximately the diode drop of the input peak, as illustrated in Fig. 1. When the input begins to decrease below its peak, as shown in part Fig. 2, the capacitor retains its charge, and the diode becomes reverse-biased. During the remaining part

4. Experiment procedure

1. Connect the circuit as shown in Fig. 1 using a standard transformer, four diodes, a 1kΩ resistor (R_L)
2. Connect the primary winding to the 220 V and a frequency of 50 Hz.
3. Display the input and output signal on the oscilloscope.
4. Measure the $V_{p.p,}$ $V_{max,}$ $V_{rms,}$ $V_{AVG,}$ and input signal frequency.

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5. Measure the $V_{p.p}$, V_{max}, V_{rms}, V_{AVG}, and output signal frequency.
6. Draw the input and output signal
7. Find the turns ratio (n) of the transformer
8. Tabulate your measurement results in a table as shown.

Input Signal (FWR) across sec. winding	**Output Signal (R_L)**
V_{rms} =	V_{rms} =
$V_{p(out)}$ =	V_p =
$V_{p(sec)}$ =	$V_{p.p}$ =
V_{AVG} = (Exp.)	V_{AVG} = (Exp.)
V_{AVG} = (Theo.)	V_{AVG} = (Theo.)
f =	f =
Draw the input signal	Draw the output signal
Find the turns ratio (n) of the transformer.	

5. Discussion

1. What would be the PIV of each diode in the above circuit?
2. On a graphic paper, draw the input and output signals on one chart (on top of each other), indicating the voltages (V_p, V_{rms}, and V_{AVG}).
3. Calculate the period of the input and output signals.