UNITED INTERNATIONAL UNIVERSITY

Lab Report 2 : Half-Wave Rectifier

Course name: Electronics Laboratory

Course code: EEE 2124

Submitted To:

M. Fahmin Rahman

Faculty of Electronics

Submitted By:

Azmain Elahi(011222289)

Sadman cabit(0112230693)

Ayan Khondokar(0112230719)

Iftakhar Mojumdar(0112230783)

Sibgatul Hassen (0112230799)

Md. Nazmul Hossen Sakib(0112230965)

Section: L

Department: Computer Science and Engineering

Submission Date: 09/03/2025

Title: Half-Wave Rectifier

Objectives:

1. **Understand Rectification** – Learn the working principle of a half-wave rectifier and its role in converting AC to DC.
2. **Observe Waveform Transformation** – Analyze how an input sinusoidal wave is converted into a unidirectional output waveform using a diode.
3. **Measure Output Characteristics** – Use an oscilloscope to observe and measure the rectified output voltage, peak voltage, and ripple effect.
4. **Analyze Diode Behavior** – Understand how the diode operates in forward and reverse bias conditions and its effect on current flow.

Brief Theory:

A half-wave rectifier is an electronic circuit used to convert an alternating current (AC) signal into a pulsating direct current (DC) signal. It achieves this by allowing only one half-cycle (positive or negative) of the AC voltage to pass through, effectively blocking the other half-cycle. It typically consists of a single diode connected in series with the load resistor.

Operation:

- **Positive Half-Cycle**: During the positive half of the input AC signal, the diode becomes forward-biased, allowing current to flow through it and the load resistor. As a result, the output voltage across the load resistor mirrors the positive half of the input signal.
- **Negative Half-Cycle**: In contrast, during the negative half of the input AC signal, the diode is reverse-biased, blocking current flow. Consequently, no voltage appears across the load resistor during this period. . This process effectively "clips" the negative half of the AC waveform, producing a pulsating DC output.

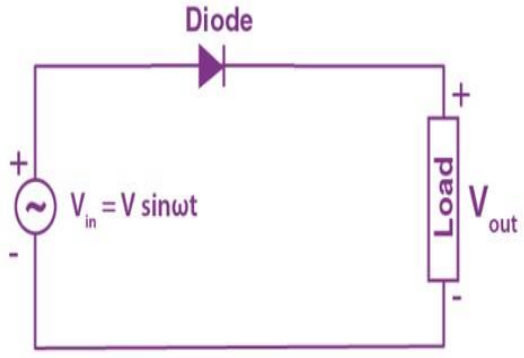
Equipment's Used:

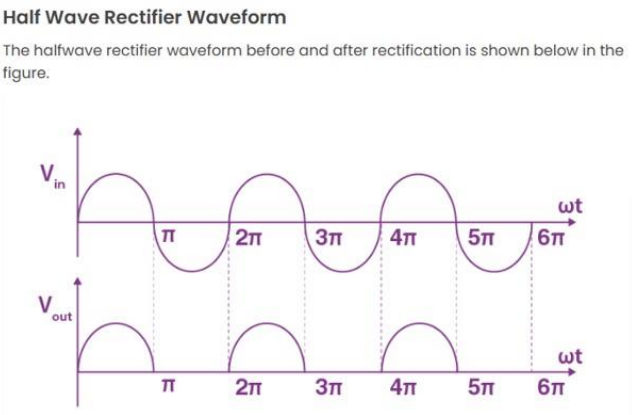
Components Required for Half-Wave Rectifier Experiment

1. **Diode (3.67 K Ω)** – Used for rectification, allowing current flow in only one direction.

2. **Resistor (Load Resistance, 0.972kΩ)** – Acts as the load to observe the rectified output voltage.
3. **Oscilloscope** – Used to observe and measure the input and rectified waveforms.
4. **Function Generator** – Provides the AC sine wave input if a transformer is not used.
5. **Multimeter** – Measures DC voltage, resistance of the load resistor, and diode characteristics.
6. **Breadboard or PCB** – Used for circuit assembly and connections.
7. **Connecting Wires** – For making electrical connections between components.
8. **Power Supply (AC source)** – Provides the input voltage for the rectifier circuit.
9. **Coaxial cable** – When measuring the waveform of the AC input or the DC output across the load resistor, a coaxial cable connects the signal point in the circuit to the oscilloscope probe.
10. **Crocodile clip** – Crocodile clips are sometimes used to attach the oscilloscope probe to the test points of the circuit, such as across the load resistor or the diode, to measure the waveform for analysis.

Circuit Diagram:





Oscilloscope Images: **Circuit Implementation:**

Conclusion:

In this experiment, we observed the working of a half-wave rectifier, where an AC sinusoidal input signal was converted into a pulsating DC output. The rectifier allowed only one half of the AC cycle to pass while blocking the other half, as seen on the oscilloscope. This resulted in a waveform consisting of positive (or negative) half cycles, depending on the diode orientation.

The experiment demonstrated key characteristics of rectification, such as:

The removal of the negative half cycle in the output signal.

A reduction in the amplitude due to the voltage drop across the diode.

The presence of ripples in the output, indicating the need for a filter to obtain smoother DC voltage.

Overall, the half-wave rectifier effectively converted AC to DC but with significant power loss and inefficiency, reinforcing the importance of full-wave rectifiers in practical applications.