

## EXPERIMENT NO. 2

**TITLE:** Verification of precision half wave rectifier and full wave rectifier using OP-AMP

**OBJECTIVE:** To verify the output voltage of precision half wave rectifier and full wave rectifier using OP-AMP.

**THEORY:** The major limitation of ordinary diodes is that it cannot rectify voltage below 0.6V, the cut-in voltage of the diode. The precision rectifier, which is also known as a super diode, is a configuration obtained with an operational amplifier in order to have a circuit behaving like an ideal diode and rectifier. It can be useful for high-precision signal processing.

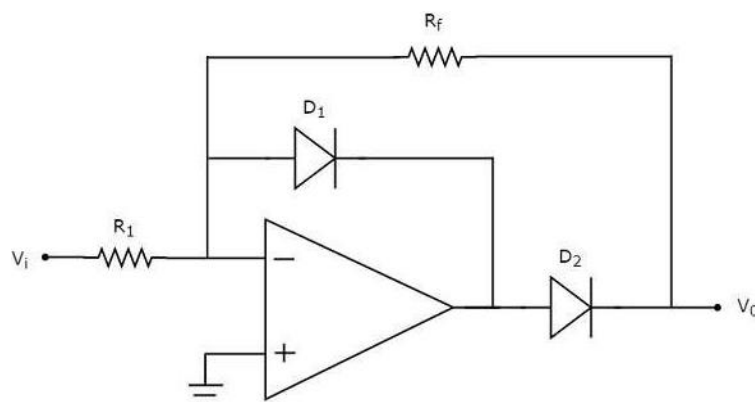
- **Half Wave Rectifier:**

A half wave rectifier is an electronic circuit. The rectifier circuit takes alternating current from the wall outlet and converts it into a positive direct current (DC) output. The particular electronic device that accomplishes this task is a semiconductor called a diode. The diode like all semiconductors is a material which has a resistance in between that of a conductor wire and an insulator like that of a plastic.

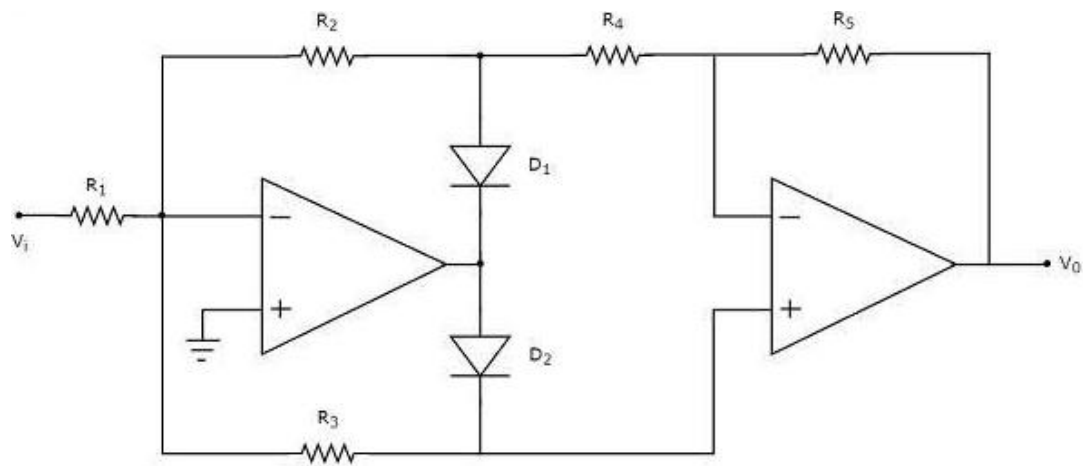
- **Full Wave Rectifier:**

A Full rectifier is a circuit which converts an ac voltage into a pulsating dc voltage using both half cycles of the applied ac voltage. It uses two diodes of which one conduct during one half cycle while the other conducts during the other half cycle of the applied ac voltage. During the positive half cycle of input voltage, diode D1 becomes forward biased and D2 becomes reverse biased. Hence D1 conducts and D2 remains OFF. The load current flows through D1 and the voltage drop across RL will be equal to the input voltage. During the negative half cycle of input voltage, D1 remains OFF and D2 conducts. The load current flows through D2 and the voltage drop across RL will be equal to the input voltage.

**CIRCUIT DIAGRAM:**

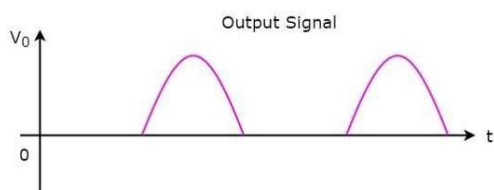
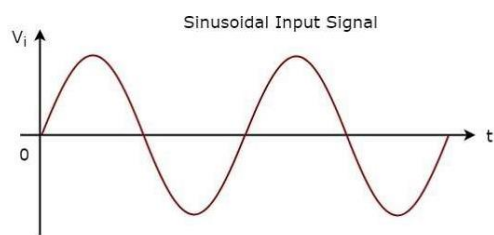


Precision Half Wave Rectifier

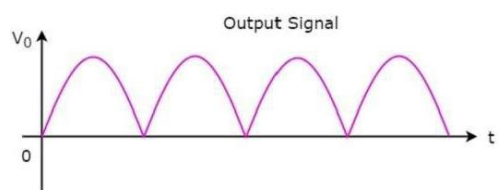
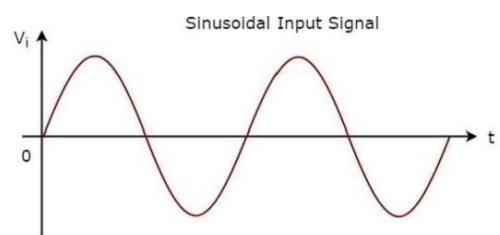


Precision Full Wave Rectifier

### MODEL GRAPHS:



Model graph for half wave precision rectifier



Model graph for full wave precision rectifier

### APPARATUS:

Sl. No.	Apparatus	Range	Quantity
1	Op-Amp	-	3
2	Resistors	-	7
3	Diodes	-	4
4	Bread Board	-	1
5	Variable DC Power Supply	10mV – 30V	1
6	Function Generator	-	1
7	Oscilloscope	-	1
8	Connecting wires	-	14

## OBSERVATIONS:

Aritra Bera

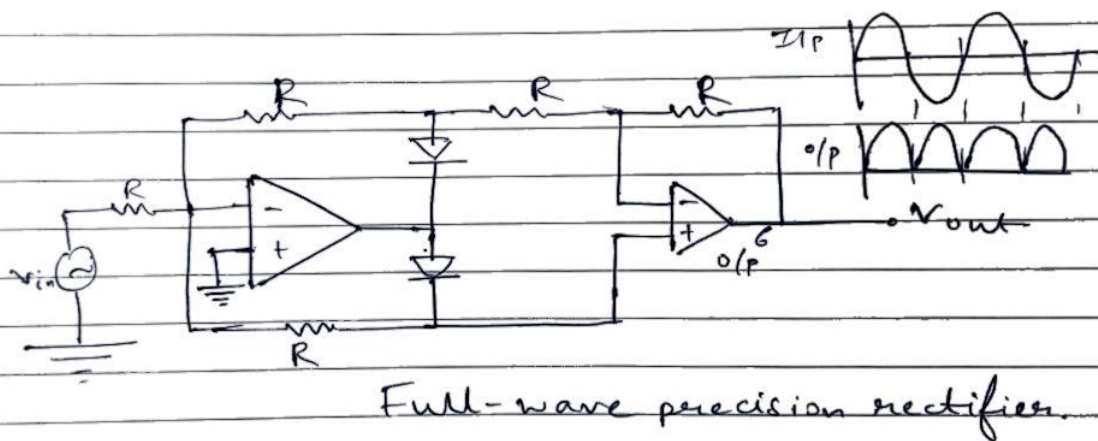
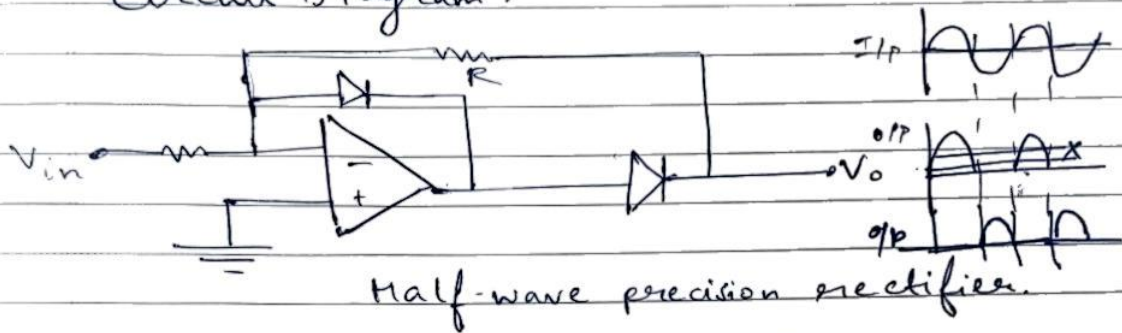
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### Experiment - 02

Verification of precision half wave rectifier and full wave rectifier using OP-AMP.

Circuit Diagram:



	$V_{in}$	$V_{out}$	% Error
1	0.695	0.720	3.6
2	0.615	0.640	4.16
3	0.55	0.520	5.45
4	0.388	0.400	3.04
5	0.278	0.320	15.1

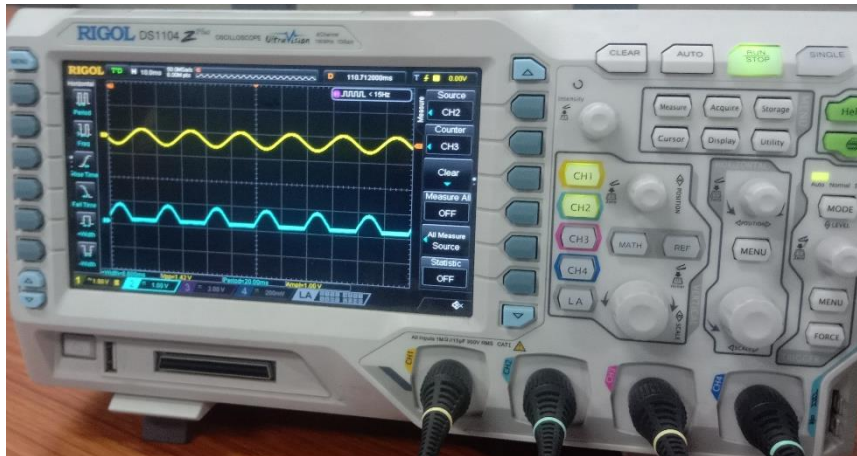
Half-wave

	$V_{in}$	$V_{out}$	% Error
1	0.695	0.76	9.3
2	0.59	0.680	15.2
3	0.520	0.520	0
4	0.417	0.480	15.1
5	0.313	0.360	15.01

Full-wave

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Graph obtained for half wave precision rectifier



Graph obtained for full wave precision rectifier

## RESULTS AND CONCLUSIONS:

Thus the half wave rectifier and full wave rectifier are constructed and the output waveforms are drawn.

The experiments confirm their effectiveness in converting AC signals to DC. Both designs outperform traditional diode rectifiers, validating their use in low-voltage applications and confirming their utility in various electronic circuits.