

**DBF Dayanand College of Arts and Science, Solapur**

# **Rectifiers, Filters and Regulators**



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**ELECTRONICS**

**Paper V: Electronic Circuits**

**Module 1: Rectifiers**

**Module Tag: DAYA\_ELE\_GSS\_PV\_C1M1**

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## Prerequisites

The student must know

- Semiconductor Diode
- Forward Biasing
- Reverse Biasing

## Learning Outcome

In this module you will learn about

- Meaning of Rectifier
- Need of Rectifier
- Types of Rectifiers
- Working of Rectifiers
- Comparison of Rectifiers

## Rectifier

- Conversion of ac voltage in to dc voltage is known as rectification
- The circuit which converts ac voltage in to dc voltage is known as rectifier
- i.e. Rectifier is a circuit which converts ac voltage in to dc voltage

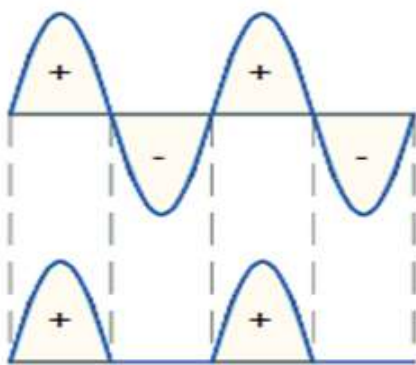
## Need of Rectifiers

- Most of the electronic devices and instruments work on dc voltage eg. Transistor radio, mobile, TV, etc
- The available input supply is ac voltage.
- Hence it is necessary to convert ac voltage in to dc voltage

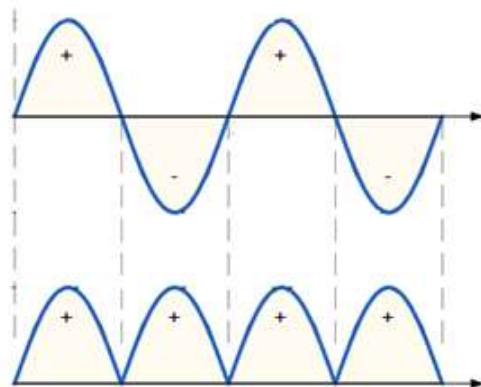
# Types of Rectifiers

There are three types of rectifiers

- Half Wave Rectifier
- Full Wave Rectifier with centre tapped transformer
- Full Wave Bridge Rectifier

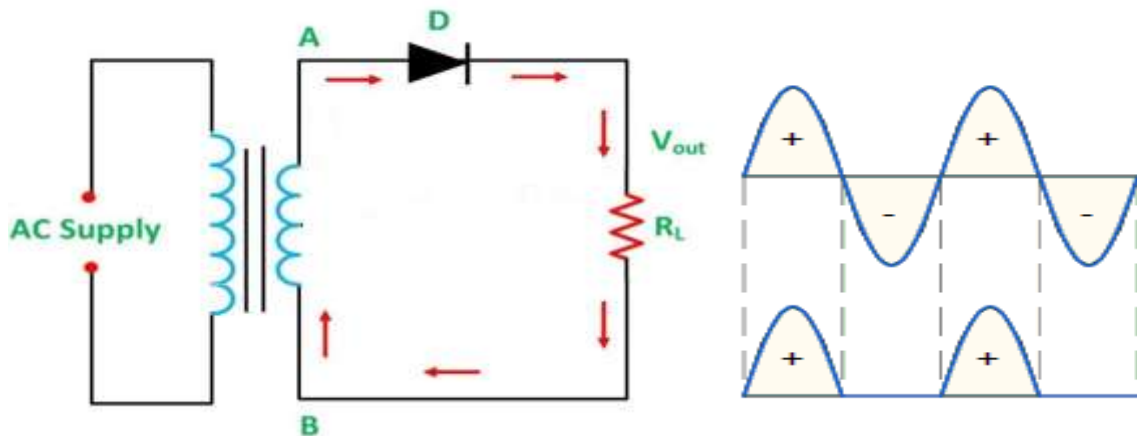


Half Wave Rectifier  
output



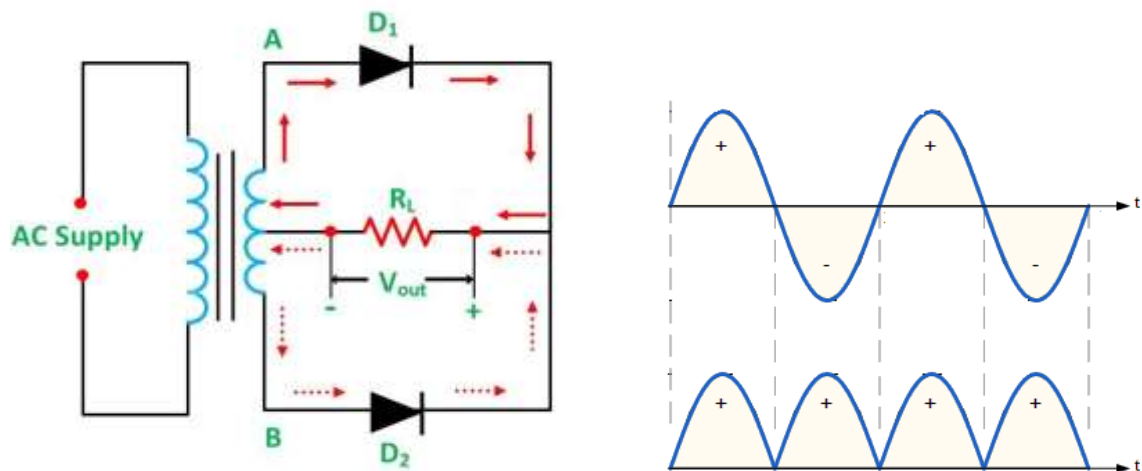
Full Wave Rectifier and  
Bridge Rectifier output

## Half Wave Rectifier



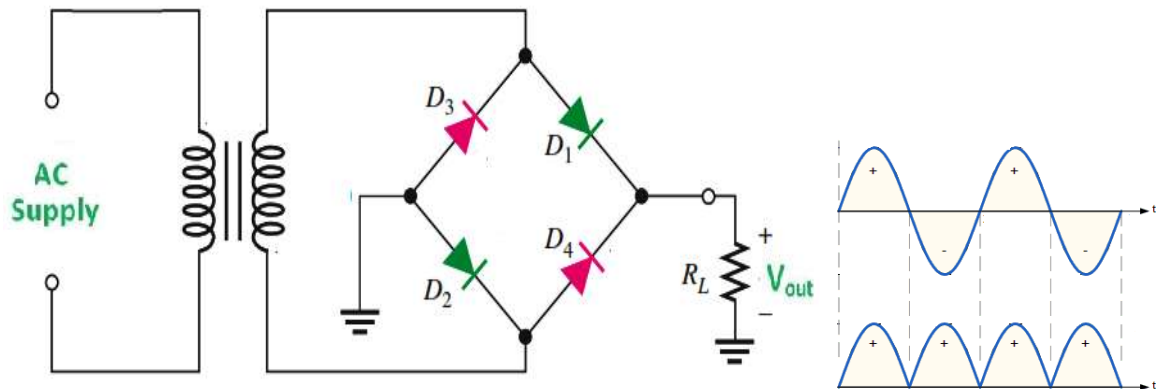
- During positive half cycle diode is forward biased. Hence current flows through the circuit and we get positive output voltage
- During negative half cycle diode is reverse biased. Hence current does not flow through the circuit and output is zero.
- Since current flows in one direction, a dc voltage is produced across  $R_L$ .
- Here only half cycle is rectified, hence it is called as half wave rectifier.

## Full Wave Rectifier



- During positive half cycle diode  $D_1$  is forward biased and  $D_2$  is reverse biased. Hence current flows through the circuit and we get positive output voltage.
- During negative half cycle diode  $D_2$  is forward biased and  $D_1$  is reverse biased. Current flow through load resistance is in the same direction and we get positive output voltage.
- Here both the half cycles are rectified; hence it is called as full wave rectifier.

## Bridge Rectifier



- During positive half cycle diodes  $D_1$  and  $D_2$  are forward biased and  $D_3$  and  $D_4$  are reverse biased. We get positive output voltage.
- During negative half cycle diodes  $D_3$  and  $D_4$  are forward biased and  $D_1$  and  $D_2$  are reverse biased. Current through load resistance is in the same direction and we get positive output voltage.
- Here both the half cycles are rectified and we get positive output voltage.
- A diode bridge is used to convert ac to dc hence it is called as bridge rectifier



## Comparison of Rectifiers

	<b>H W Rectifier</b>	<b>F W Rectifier</b>	<b>Bridge Rectifier</b>
No. of Diodes	1	2	4
DC O/P Voltage	$V_p/\pi$	$2V_p/\pi$	$2V_p/\pi$
Efficiency (%)	40.6%	81.2%	81.2%
Ripple Factor	121%	48.2%	48.2%
Peak Inverse Voltage	$V_p$	$2V_p$	$V_p$
O/P frequency	f	2f	2f

## Links for Videos and Assignment

### Video 1

<https://drive.google.com/file/d/1Xf-iMD1fwJ48hvOVYbPc1Wn239R7eGMg/view?usp=sharing>

### Video 2

[https://drive.google.com/file/d/1rFmmczk\\_bgkFvtwIQI8qpZHTtgB4yVoC/view?usp=sharing](https://drive.google.com/file/d/1rFmmczk_bgkFvtwIQI8qpZHTtgB4yVoC/view?usp=sharing)

### Video 3

<https://drive.google.com/file/d/1nLWwoVfwoMtjo7y1ZpoPGBFAfmzoXeXL/view?usp=sharing>

### Assignment

<https://forms.gle/EfRAdgEUZaeukRC2A>

## Additional Resources

1. A text book of Applied Electronics by R. S. Sedha. S. Chand Publication.
2. Electronic Devices and Circuits by Boylestad
3. Basic Electronics (Solid State) by B. L. Theraja, S. Chand & Company Ltd.
4. Basic Electronics and Linear Circuits by N. N. Bhargaya D. C. Kulshreshtha & S. C. Gupta TMH