



# **SNS COLLEGE OF TECHNOLOGY**

## **(AN AUTONOMOUS INSTITUTION)**

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## **Department of Biomedical Engineering**

**Course Name: 23BMB101-Electron Devices and Circuits**

**I Year : II Semester**

**Unit I –Semiconductor Diodes**

**Topic : Half Wave Rectifiers**



# INTRODUCTION

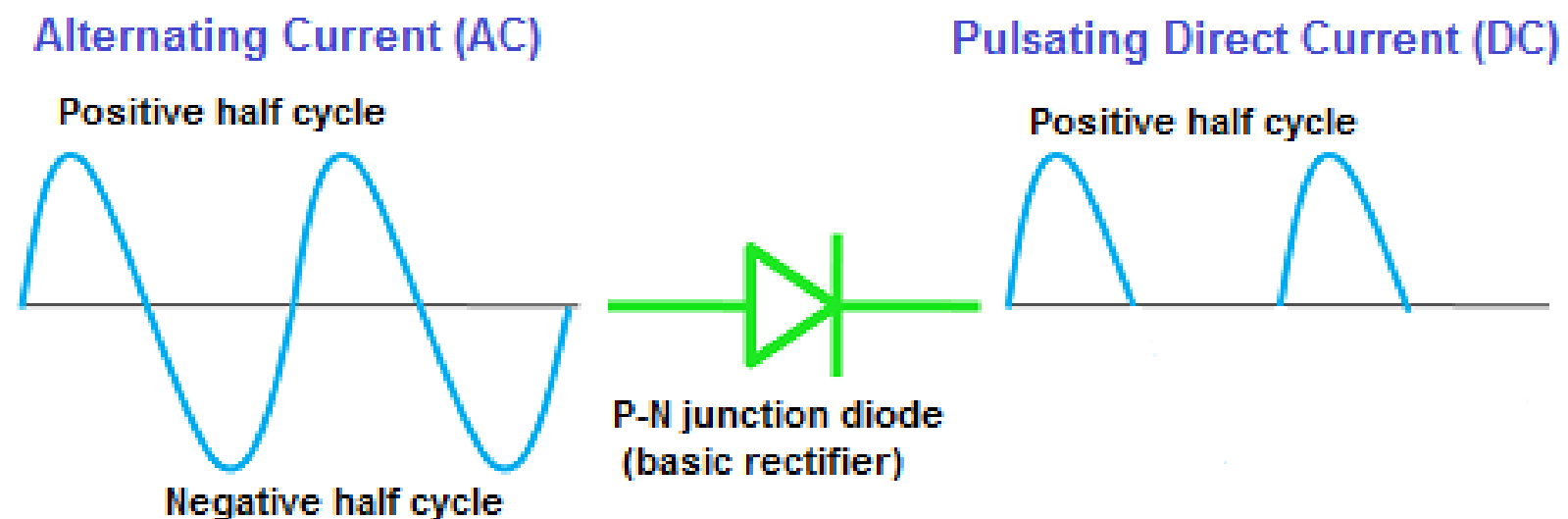


- The main application of p-n junction diode is in rectification circuits.
- A rectifier is nothing but a simple diode or group of diodes which converts the Alternating Current (AC) into Direct Current (DC). Vision Title 3
- A diode allows electric current in one direction and blocks electric current in another direction. This principle is used to construct various types of rectifiers.
- Rectifiers are classified into different types based on the number of diodes used in the circuit or arrangement of diodes in the circuit.

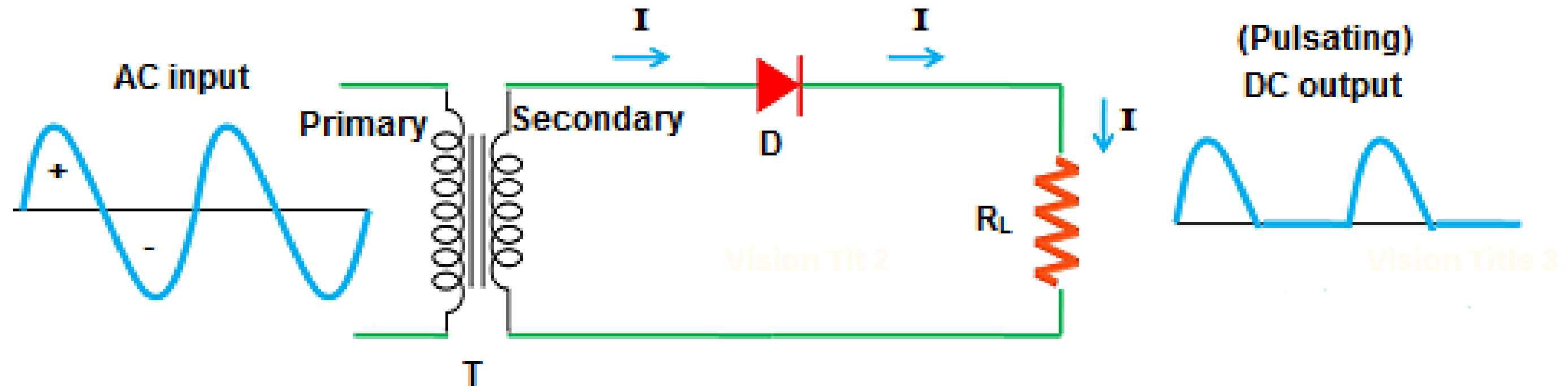


# Half Wave Rectifier

- A half wave rectifier is a type of rectifier which converts the positive half cycle (positive current) of the input signal into pulsating DC (Direct Current) output signal.
- If the positive half cycle is allowed then the negative half cycle is blocked. Similarly, if the negative half cycle is allowed then the positive half cycle is blocked.



# Working



**I** = Current

**D** = Diode

**R<sub>L</sub>** = Load resistor

**T** = Transformer

**+** = Positive half cycle

**-** = Negative half cycle

## Half wave rectifier



# Characteristics of Half Wave Rectifier



## RIPPLE FACTOR

**Ripple factor is the ratio of RMS value of the AC component of the output voltage to the DC component of the output voltage.**

$$\gamma = \sqrt{\left(\frac{V_{rms}}{V_{DC}}\right)^2 - 1}$$



# Characteristics of Half Wave Rectifier

DC Current

$$I_{DC} = \frac{I_{max}}{\pi}$$

$I_{max}$  is the maximum DC load current

DC Output voltage

$$V_{DC} = \frac{V_{Smax}}{\pi}$$

$V_{Smax}$  is the maximum secondary voltage

Vision Tit 2



# Characteristics of Half Wave Rectifier



## Form Factor

**The form factor is the ratio of RMS value to the DC value. For a half-wave rectifier, the form factor is 1.57**

## Rectifier Efficiency

**Rectifier efficiency is the ratio of output DC power to the input AC power. For a half-wave rectifier, rectifier efficiency is 40.6%.**



# Advantages and Disadvantages



<b>Advantages</b>	<b>Disadvantages</b>
<b>Affordable</b>	<b>Ripple production is more</b>
<b>Simple connections</b>	<b>Harmonics are generated</b>
<b>Easy to use as the connections are simple</b>	<b>Utilization of the transformer is very low</b>
<b>Number of components used are less</b>	<b>The efficiency of rectification is low</b>