

RIZVI COLLEGE OF ARTS, SCIENCE & COMMERCE

Sub: ELECTRONICS (Bifocal)

Std : XII

Chapter/Topic: Rectifier

BY : SAFDAR ULDE

Dept : Bifocal Electronics Junior College



➔ Chapter: Power Supply
Topic: Rectifier
Types: Three



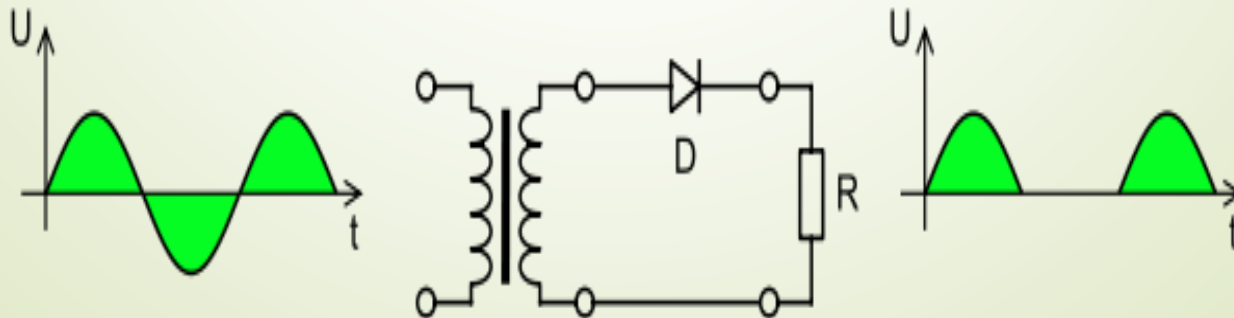
What is a Rectifier ?

- A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction.
- This process is known as rectification.

Rectifier circuits

Half-wave rectification

- In half wave rectification of a single-phase supply, either the positive or negative half of the AC wave is passed, while the other half is blocked.
- Because only one half of the input waveform reaches the output, mean voltage is lower. Half-wave rectification requires a single diode in a single-phase supply, or three in a three-phase supply.



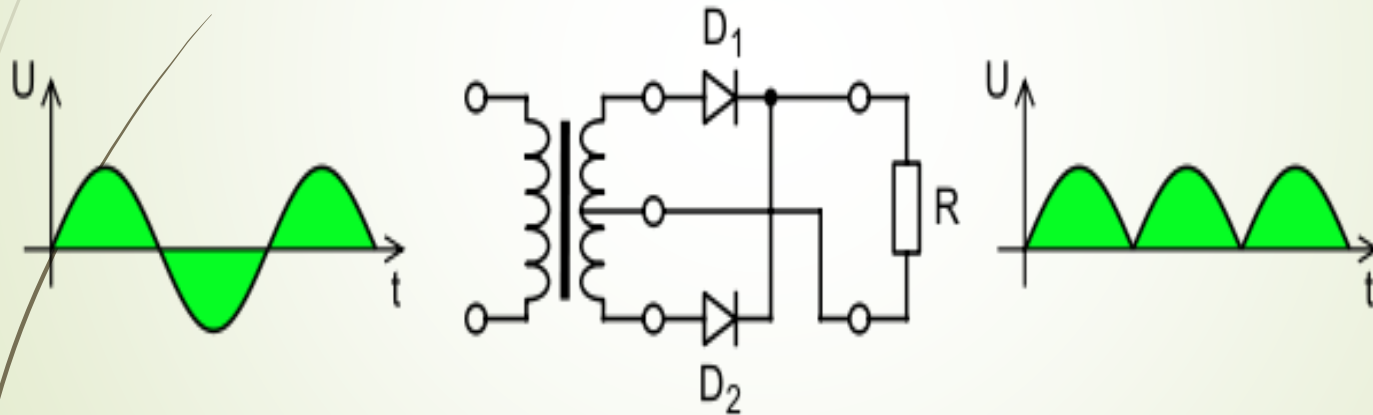


Full-wave rectification

- A full-wave rectifier converts the whole of the input waveform to one of constant polarity (positive or negative) at its output.
- Full-wave rectification converts both polarities of the input waveform to DC (direct current), and yields a higher mean output voltage.

Center tap transformer

- Full-wave rectifier using a center tap transformer and 2 diodes.

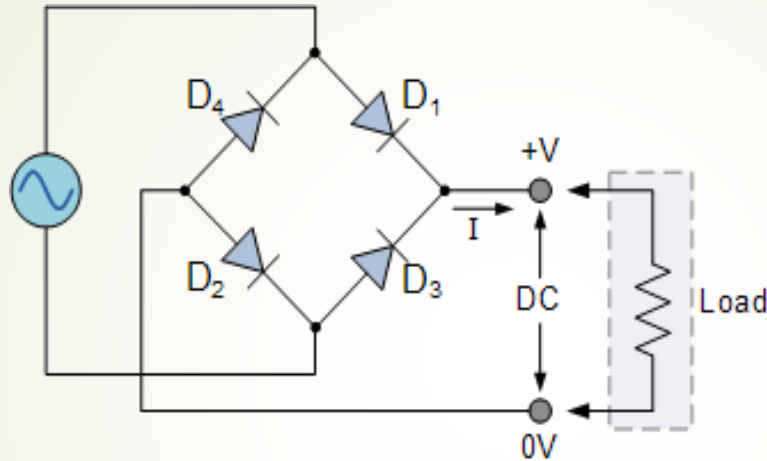




What is a bridge rectifier?

- Bridge rectifier is a **full wave rectifier circuit** using the combination of four diodes to form a bridge.
- Advantage - it converts both the half cycles of AC input into DC output.

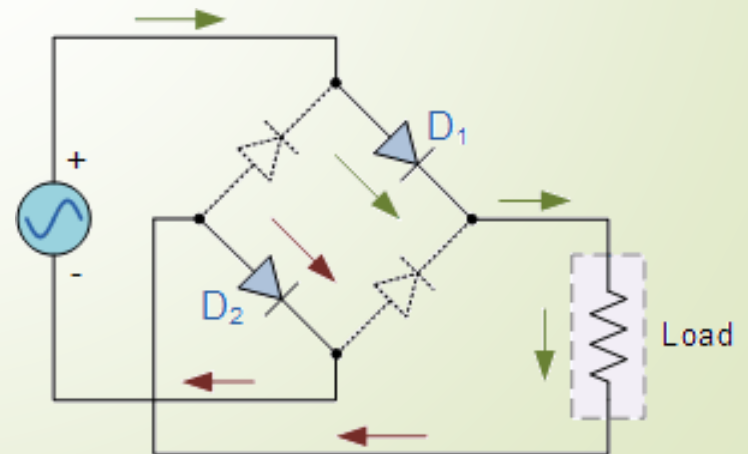
The Diode Bridge Rectifier



- The four diodes labelled D_1 to D_4 are arranged in “series pairs” with only two diodes conducting current during each half cycle.

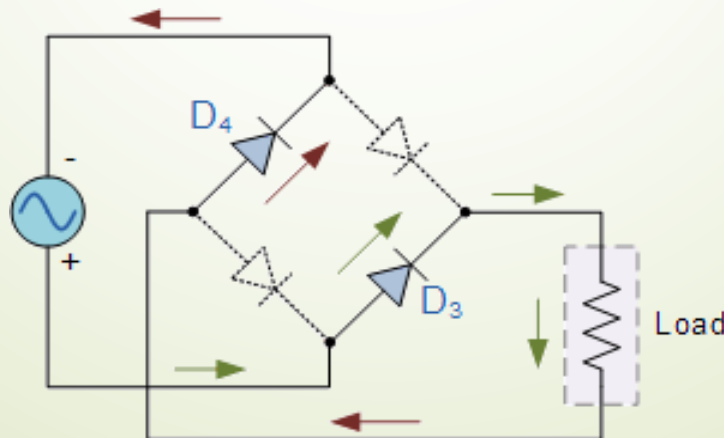
The Positive Half-cycle

- During the positive half cycle of the supply, diodes D_1 and D_2 conduct in series while diodes D_3 and D_4 are reverse biased and the current flows through the load as shown below



The Negative Half-cycle


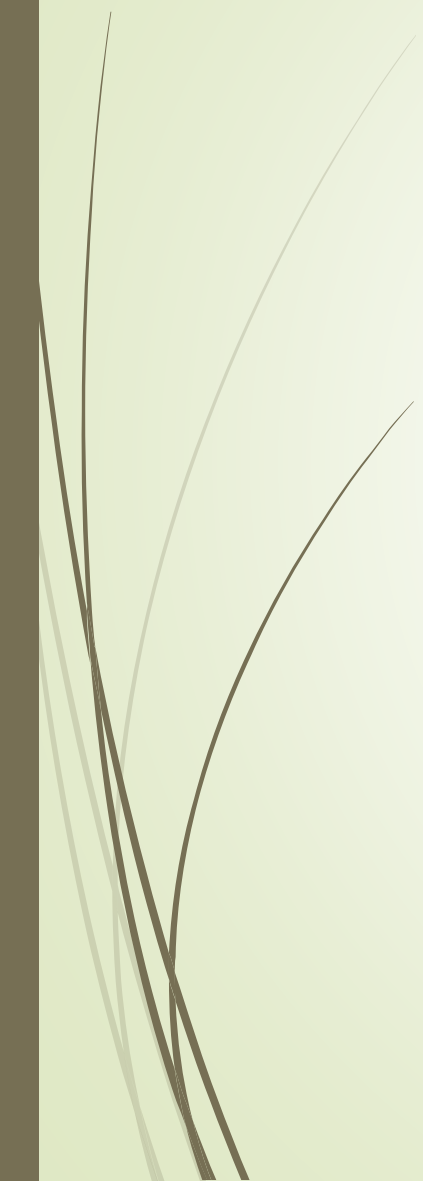
- During the negative half cycle of the supply, diodes D3 and D4 conduct in series, but diodes D1 and D2 switch “OFF” as they are now reverse biased. The current flowing through the load is the same direction as before.
- The average DC voltage across the load is $0.637V_{\max}$.





Applications

- Because of their low cost compared to center tapped they are widely used in power supply circuit.
- This can be used to detect the amplitude of modulated radio signal.
- Bridge rectifiers can be used to supply polarized voltage in welding.
- The rectification efficiency of full-wave rectifier is double of that of a half-wave rectifier.

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- The ripple voltage is low and of higher frequency in case of full-wave rectifier so simple filtering circuit is required.
 - Higher output voltage, higher output power and higher Transformer Utilization Factor (TUF) in case of a full-wave rectifier.
 - The PIV is one half that of center-tap rectifier.