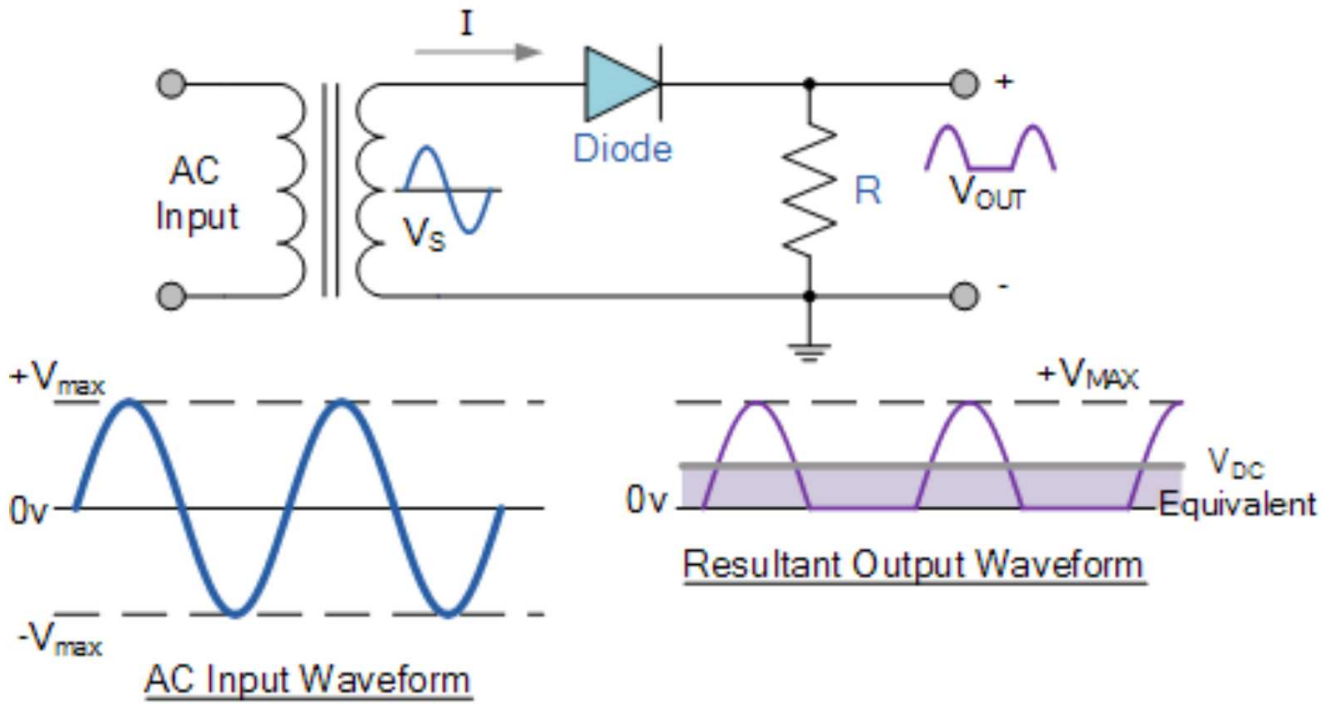
Half Wave Rectifier

LECTURE 3

DR. SK WIJAYASEKARA

Rectification

- Is the process of conversion of alternating current (AC) to direct current (DC).
- This involves a device that only allows one-way flow of electric charge.
- Rectifier can be categorised into Half Wave and Full Wave Rectifiers.



Half Wave Rectifier

Average Value

V_{rms} - The Root Mean Square (RMS) Value of Output Voltage

Current

Peak Voltage Inverse (PIV)

- Peak Inverse Voltage (PIV) is the maximum voltage that the diode can withstand during reverse bias condition.

- If a voltage is applied more than the PIV, the diode will be destroyed.

Ripple Factor of Half Wave Rectifier

- ‘Ripple’ is the unwanted AC component remaining when converting the AC voltage waveform into a DC waveform.
- Even though we try out best to remove all AC components, there is still some small amount left on the output side which pulsates the DC waveform.
- This undesirable AC component is called ‘ripple’.

Ripple Factor of Half Wave Rectifier

The formula for ripple factor is

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

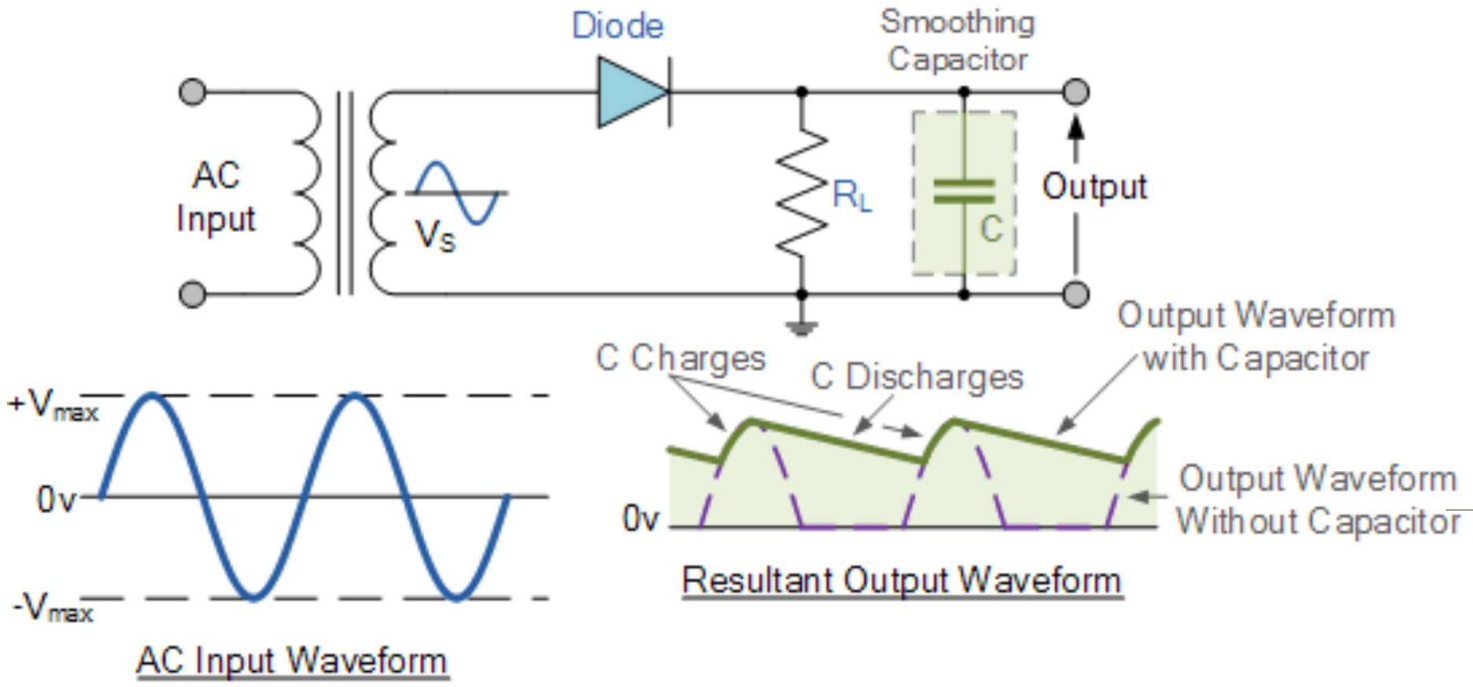
Efficiency of Half Wave Rectifier

Rectifier efficiency (η) is the ratio between the output DC power and the input AC power. The formula for the efficieny is equal to:

$$\eta = \frac{P_{dc}}{P_{ac}}$$

The efficiency of a half wave rectifier is equal to 40.6% (i.e. η_{max} = 40.6%)

Half-wave Rectifier with Smoothing Capacitor



Thank You