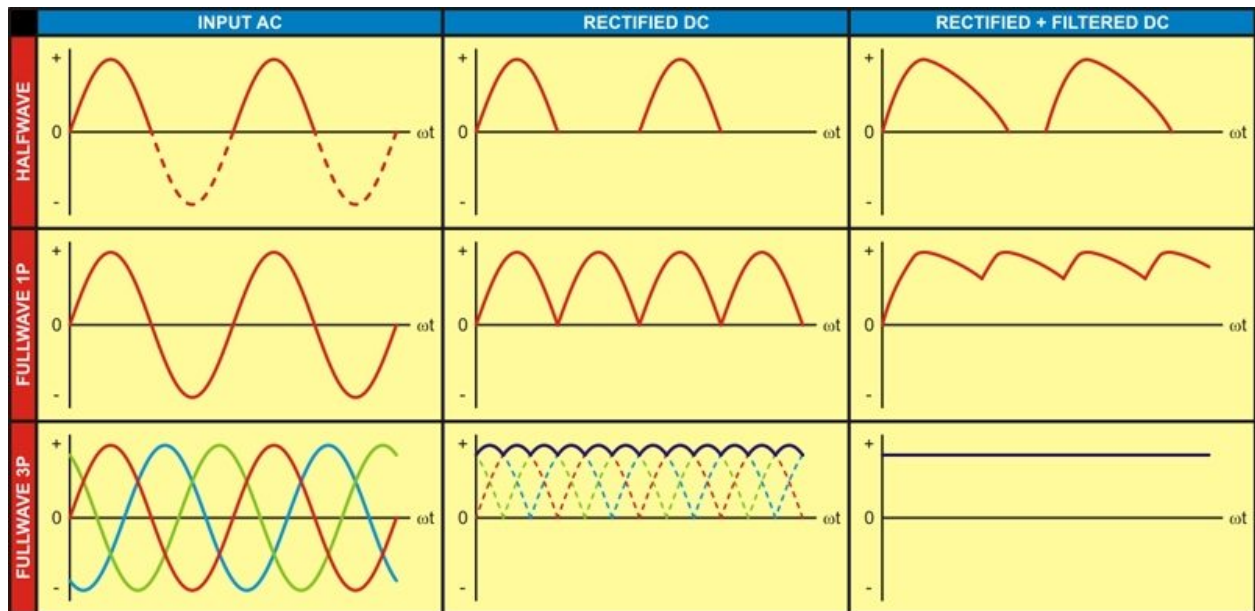
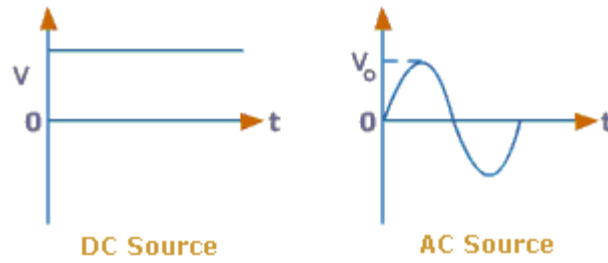
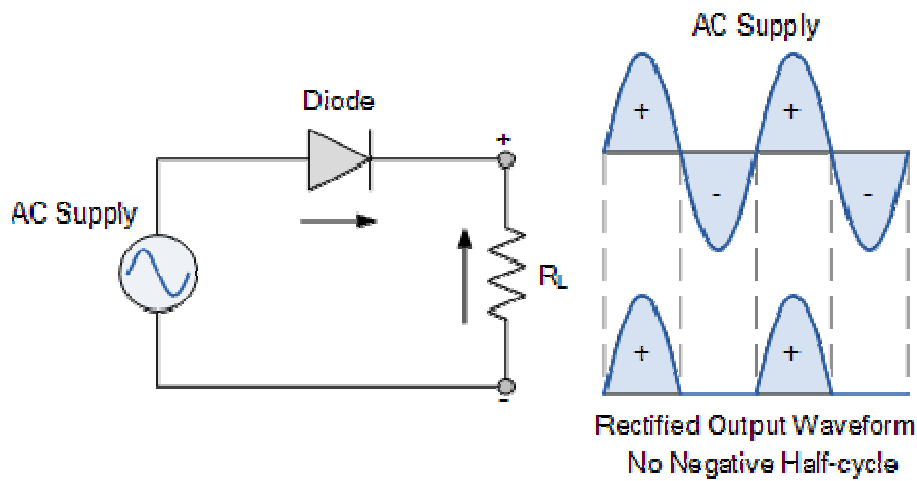
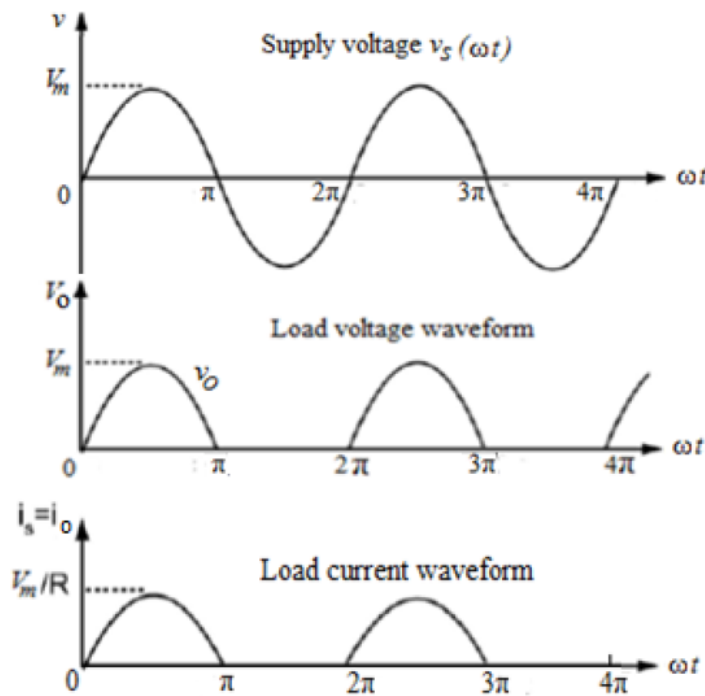


Rectifier: A **rectifier** is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction.



Half wave Rectifier:





$$V_{dc} = \frac{1}{2\pi} \int_0^{\pi} v_s(\omega t) d\omega t \quad \mathbf{v_s = V_m \sin \omega t}$$

$$\frac{V_m}{\pi}$$

$$I_{dc} = \frac{V_{dc}}{R} = \frac{V_m}{\pi R}$$

$$P_{dc} = V_{dc} I_{dc} = \frac{V_{dc}^2}{R}$$

$$V_{orms} = \sqrt{\frac{1}{2\pi} \int_0^{\pi} v_s^2(\omega t) d\omega t} = \frac{V_m}{2}$$

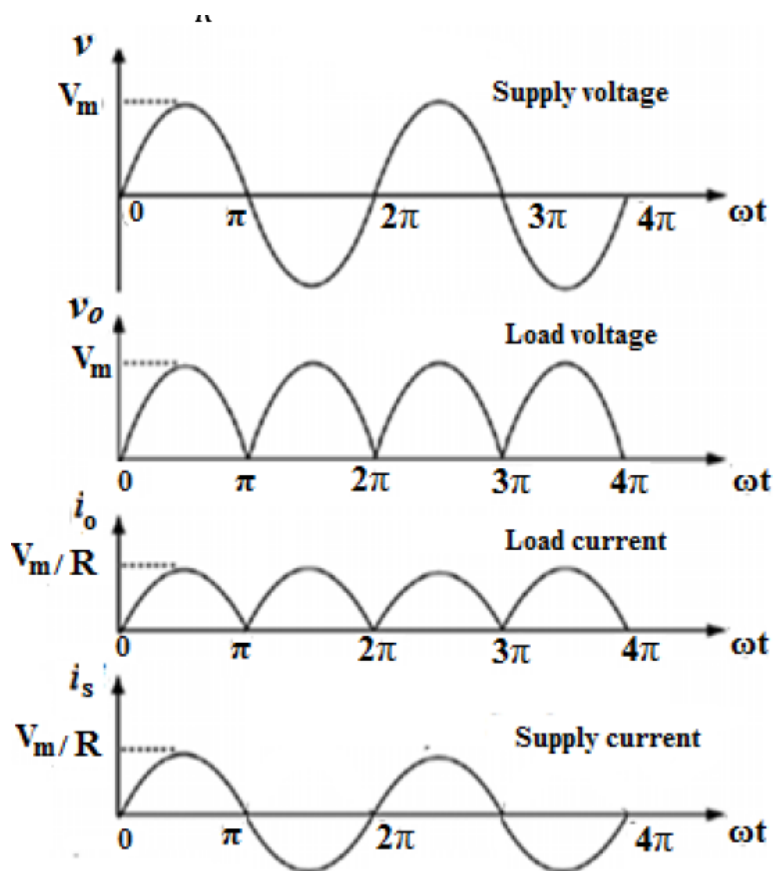
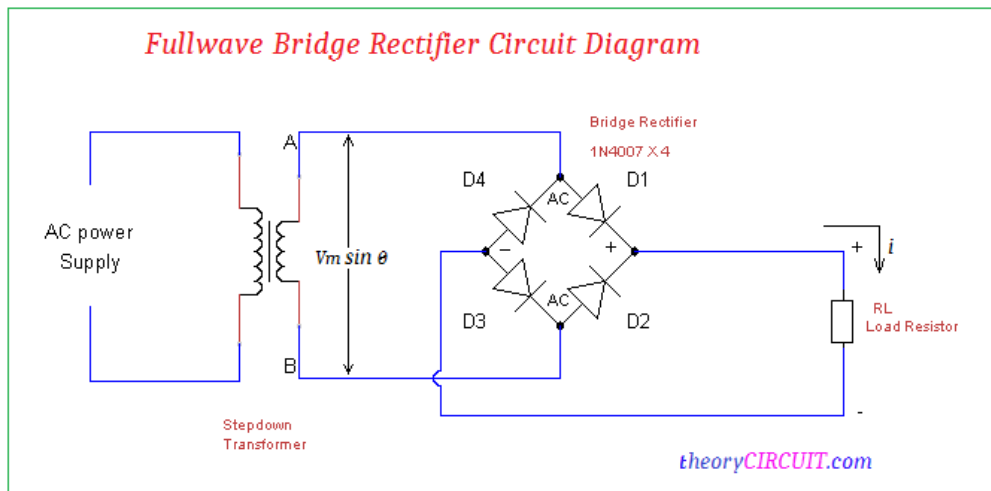
$$\eta = \frac{P_{dc}}{P_{ac}}$$

$$V_{ac} = \sqrt{V_{orms}^2 - V_{dc}^2}$$

$$FF = \frac{V_{orms}}{V_{ac}}$$

$$RF = \frac{\text{rms value of the ac components}}{\text{average value}} = \frac{V_{ac}}{V_{dc}}$$

Full Wave rectifier:



$$V_{dc} = \frac{1}{\pi} \int_0^{\pi} V_m \sin \omega t \, d\omega t = \frac{2V_m}{\pi}$$

$$V_{rms} = \sqrt{\frac{1}{\pi} \int_0^{\pi} v_s^2(\omega t) d\omega t} = \frac{V_m}{\sqrt{2}}$$