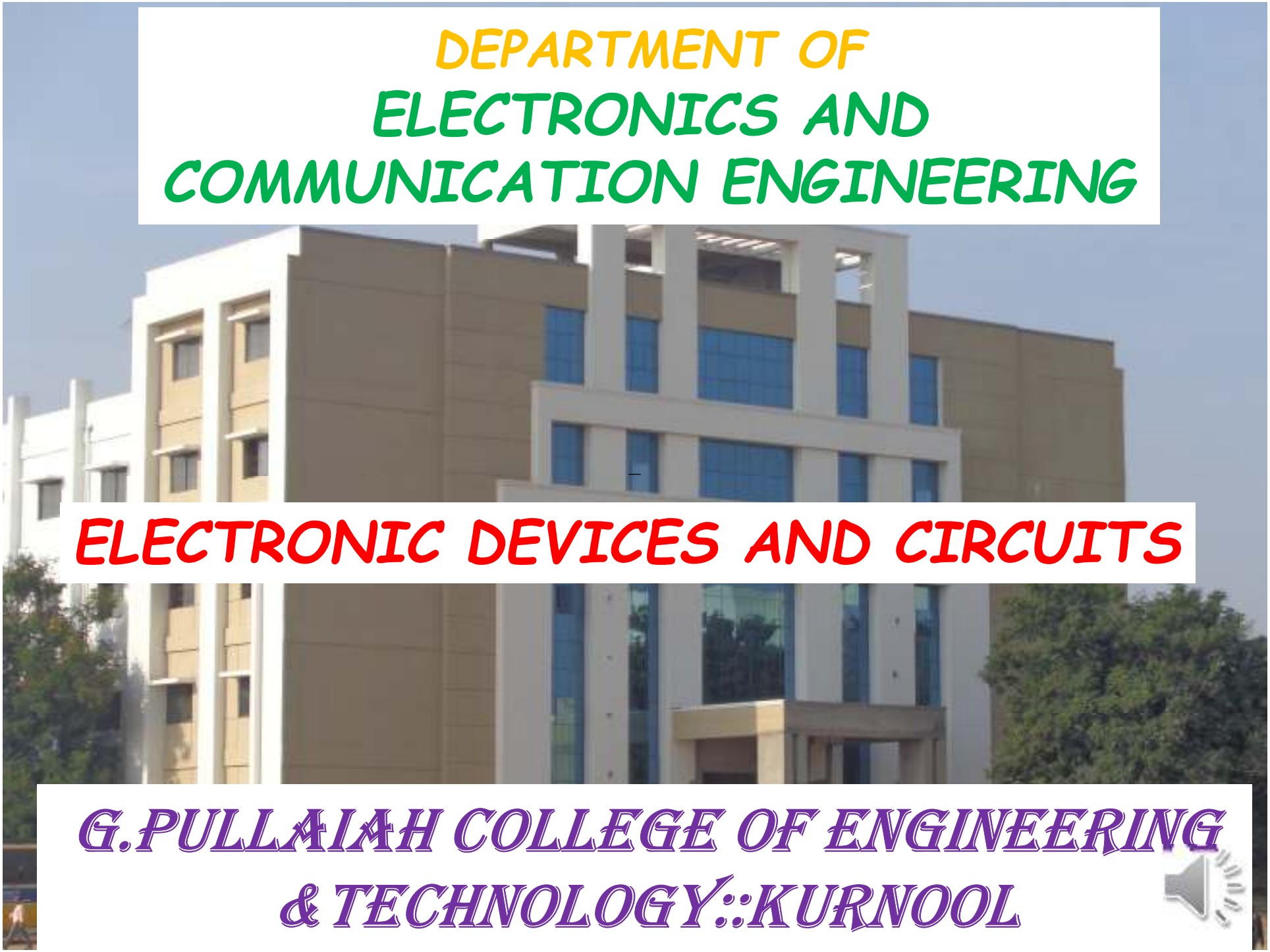


DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

ELECTRONIC DEVICES AND CIRCUITS

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY::KURNOOL

UNIT-II

RECTIFIERS AND FILTERS

CONTENT

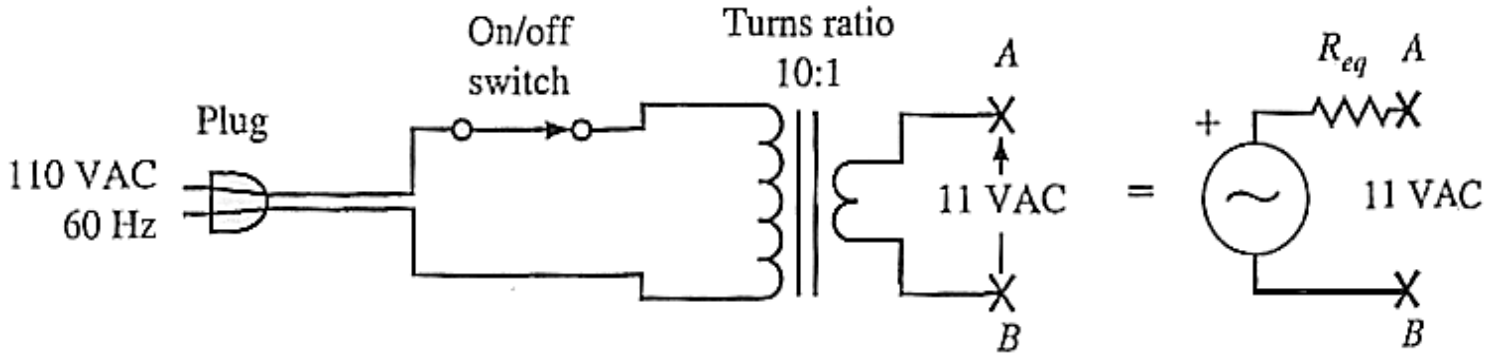
- Half Wave Rectifier
- Full Wave Rectifier
- Inductor filter
- Capacitor filter
- L- section filter
- $\prod$- section filter
- Multiple L- section and Multiple $\prod$ section filter

Power Supply Circuits

- To achieve its purpose a power supply must:
  - Step down the voltage supplied
  - Convert ac to dc by rectifying the ac
- A transformer is used to step down the magnitude of the voltages from the wall receptacle.

Transformer

- A transformer consists of two coils of wire on a common iron core. The voltages on these two coils are related by the *turns ratio*, which is the ratio of the number of turns of wire in the secondary coil to that in the primary coil.



RMS Values

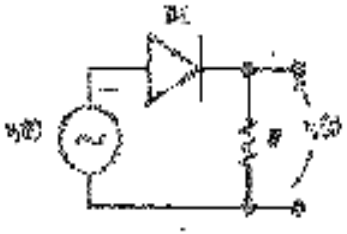
- Note that the 110-120 volts and 220-240 volts are RMS values.
- The actual amplitude of that sinusoidal signal is a factor of $\sqrt{2}$ larger.

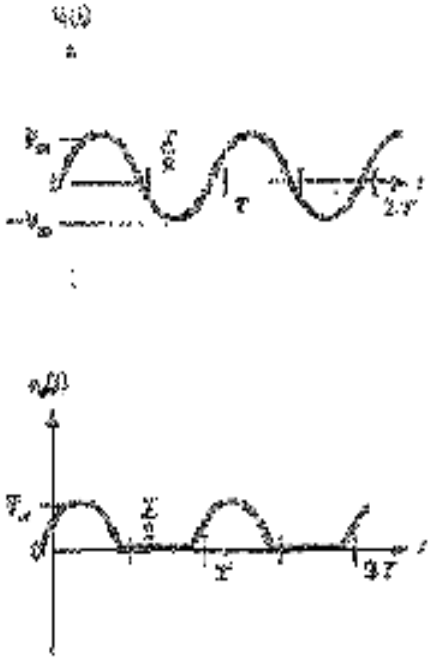
Rectification

- Converting AC to Pulsating DC is accomplished by the process of rectification.
- Two processes are used:
  - Half-wave rectification;
  - Full-wave rectification.

Half-wave Rectification

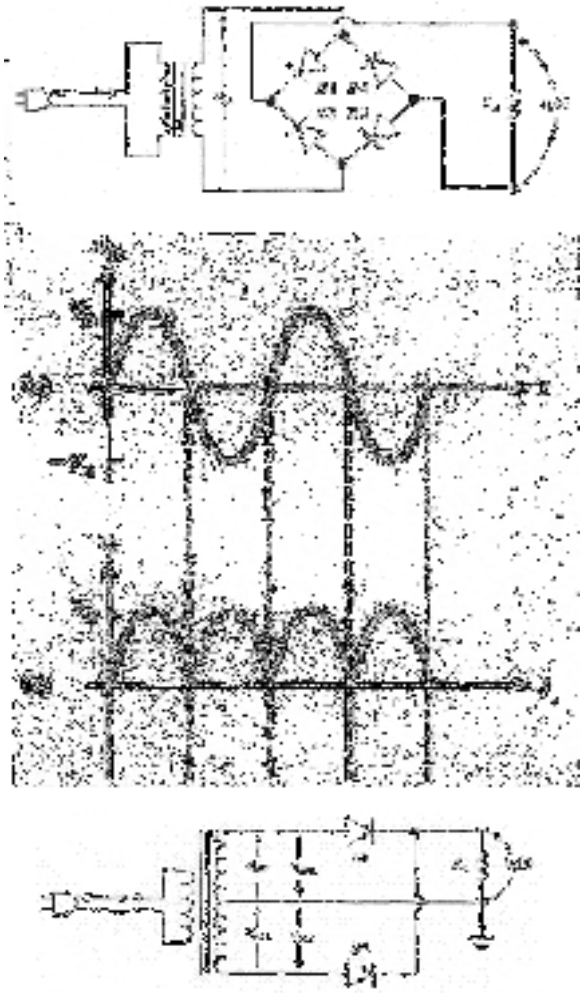
- Simplest process used to convert ac to dc.
- A diode is used to clip the input signal excursions of one polarity to zero.





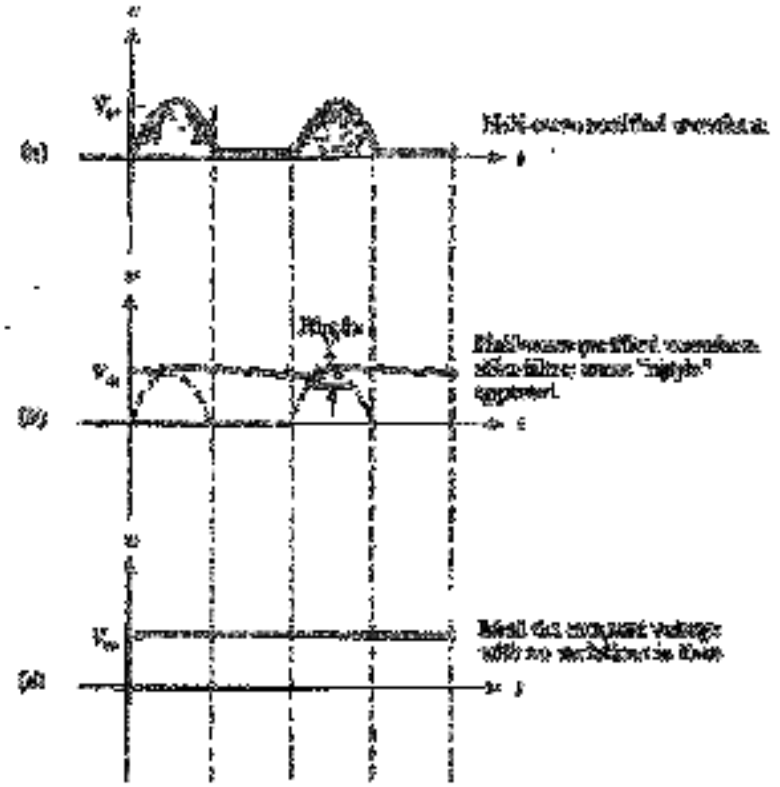
Full-wave Rectification

- The output of a full-wave rectifier is driven by both the positive and negative cycles of the sinusoidal input, unlike the half-wave rectifier which uses only one cycle.



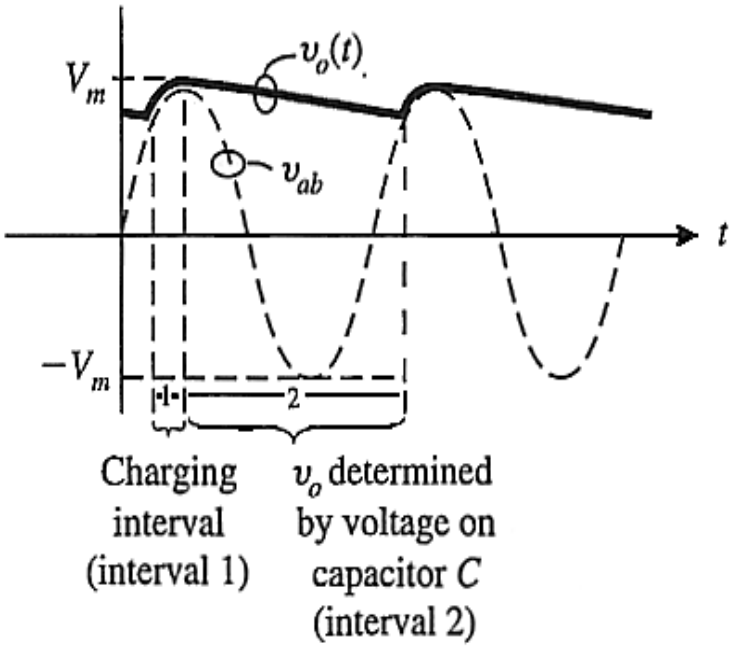
Filtering

- Process used to smooth out the output of the rectifier circuit.
- One of the most common filter is the RC network.



Filtering

- The reduction in voltage between charging cycles is dependent on the time constant stated below:



$$\tau = R_L C$$

$$v(t) = V_m e^{-\frac{t}{\tau}}$$

Ripple Factor

- Ripple is the small voltage variation from the filter's output.
- Good power supplies produce as little ripple as possible.
- Ripple is usually specified as *Ripple Factor*, *RF* :

$$RF = \frac{rms\ value\ of\ ripple}{dc\ value}$$