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Class-D II (H)

Paper - IV 'C'

* Solid-State Rectifier →

→ A solid state rectifier is an electronic device used to convert AC (Alternating current) to DC (Direct current).

→ It is a semiconductor device that replace the traditional vacuum tube rectifiers.

→ Solid state rectifiers are widely used in various electronic applications and power supply systems due to their efficiency, reliability and compact size.

→ ~~A~~ A diode rectifier is the most common type of solid state rectifier. A diode is two ~~type~~ terminal semiconductor device that allows current to flow in one direction while blocking it in the opposite direction. It acts as a one-way valve for electrical current.

When the diode is forward ~~biased~~ biased [The positive voltage is applied to its ~~anode~~ anode terminal and the negative voltage to its cathode terminal] it allows current to flow through. When a diode is reverse-biased [The positive voltage is applied to its cathode terminal and the negative voltage to its anode terminal] it blocks the current flow.

→ In A ~~solid~~ solid state rectifier circuit diode are ~~arranged~~ arranged in a ~~configuration~~ configuration known as a rectifier bridge or a full-wave bridge rectifier. A rectifier bridge consists of four diodes connected

in a specific arrangement. The AC input voltage is applied to two input terminals of the bridge, and the output is taken from the remaining two terminals.

During the positive half cycle of the AC input voltage, one of the diodes in the rectifier bridge becomes forward-biased and allows current to flow through it while the other diode remains reverse-biased and blocks the current. During the negative half cycle, the roles of the diodes reverse, with the previously reverse-biased diode becoming forward-biased. As a result, the current always flows in the same direction through the load, creating a pulsating DC output voltage.

To smoothen the output and convert it into a more constant DC voltage, a filter capacitor is connected in parallel with the load. The capacitor charges during the peaks of the pulsating DC waveform and discharges during the gaps between the peaks, effectively reducing the ripple voltage and producing a smoother DC output. The solid-state rectifier circuit consisting of diodes and a filter capacitor converts the AC input voltage into a relatively stable DC output voltage suitable for powering electronic devices and systems.