

Power Electronics

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Course: Power Electronics
Topic: AC-DC Converters
Semester: V
Academic Year: 2019-20
Teaching Methodology: Video Demonstration

About the Course: This course is specially designed for V Semester students. This will give the students to analyze the operation of AC voltage controllers and cycloconverters. They will get to know about the about the operation of 3- ϕ half wave, 3- ϕ full wave and 3- ϕ semi controlled rectifier. They will eventually gain an understanding the concepts source inductance.



Fig.1 Introduction to Power Electronics

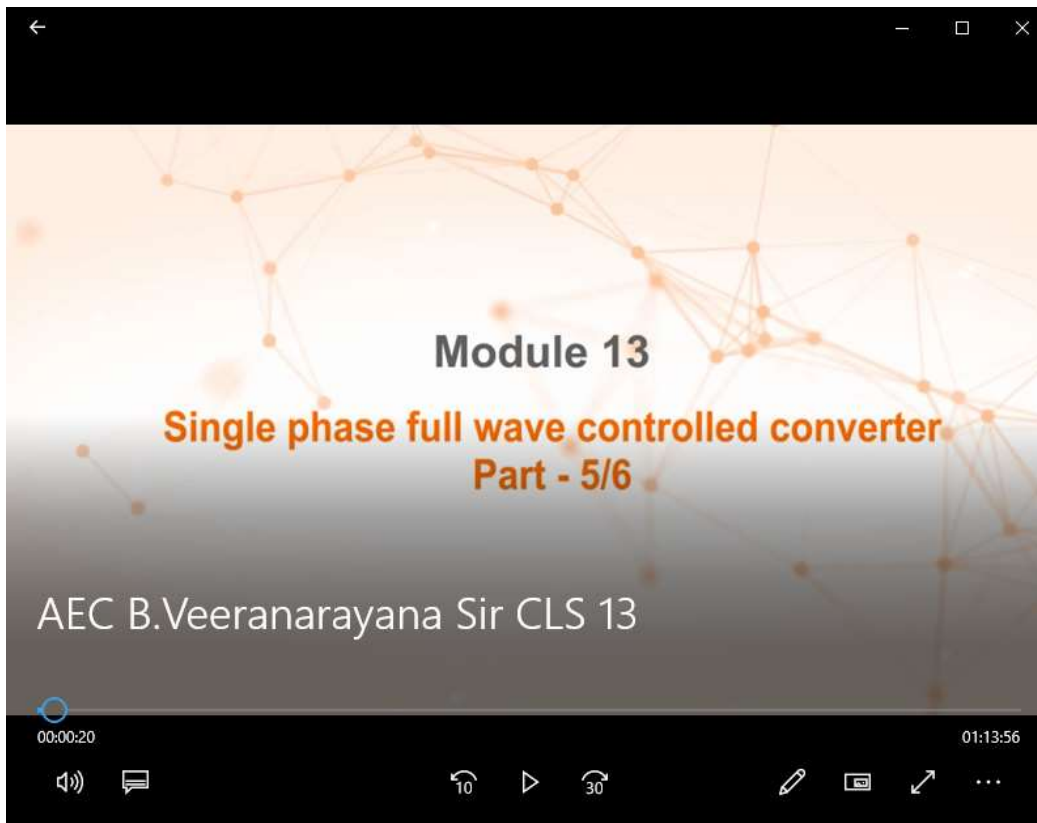


Fig.2 Introduction to single phase full wave controlled converter

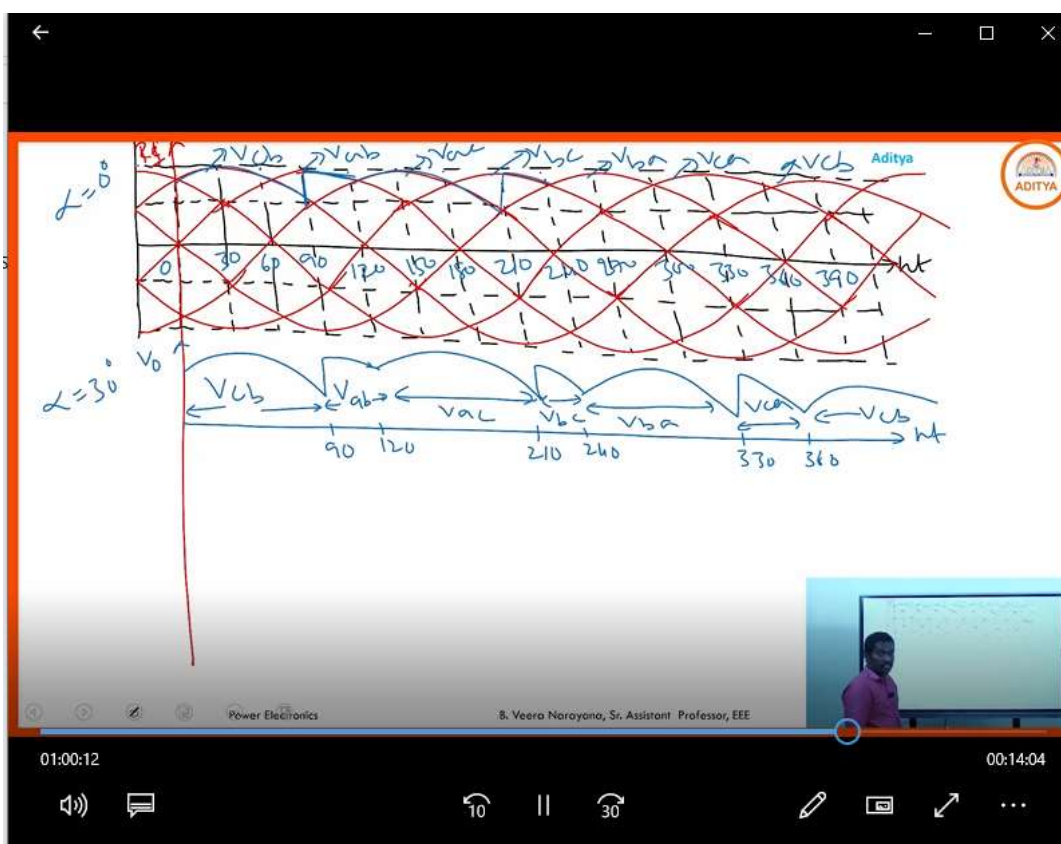


Fig.3 Video Demonstration of 3-phase rectifier

Innovative Teaching Methodology: Video Demonstration

A video lecture, or a video lesson, is an educational video that focuses on a particular topic. One of the biggest advantages of using video in class is its ability to motivate students. Knowing that they can understand a real person speaking English is a milestone for many students. Students can go back and rewatch or review content as needed. That's great for studying for exams or for students who just need a little more time to consider or absorb important content.

About the Topic: AC-DC Converters

An AC-DC Converter is a device that converts an AC voltage to DC voltage. Electricity supplied to homes is typically 100V or 200V AC. On the other hand, most electronic devices operate at 3.3V or 5V DC. Consequently, it is necessary to convert from AC to DC voltage. Some motors and lamps can be driven even with AC voltage, but for motors that include control circuitry (i.e. MCUs) and lamps that have switched to energy-saving LEDs, AC-DC conversion is required.

The electricity is generated at power plants from hydro, nuclear, and thermal sources. These power plants are often located in mountainous and coastal areas, making it more advantageous to send AC voltage to urban areas. Simply put, transmitting high AC voltage at low current minimizes transmission (energy) loss. However, since the high AC voltage cannot be used in the home as-is, it is transformed (stepped down) in stages via several substations before finally reaching 100V or 200V at the outlet. These transformed voltages are also sent via AC since AC is easier to transmit.

Concepts like 3- ϕ half wave controlled rectifier with R-load, RL-load and 3 ϕ fully Controlled rectifier with R- load, RL-load and RLE load are demonstrated. Also, topics like 3- ϕ semi controlled converter with R-load, RL-load are explained clearly.

Course Outcomes:

Student will be able to:

- Understand the principle of 3- ϕ half and full wave controlled rectifiers.
- Derive the voltage, current and power equations of 3- ϕ controlled rectifiers.