Course Type	Course Code	Name of Course	L	T	P	Credit
DC	EEC310	Power Electronics	3	0	0	9

Course Objective

The objective of this course is to understand the concept of power electronic switches using semiconductor devices and the operating principle of different power electronic converter circuits. The goal is to familiarize a student with various power electronic systems that process electrical energy for a wide range of applications.

Learning Outcomes

Upon successful completion of this course, students will:

- be able to understand the operating characteristics of different power electronic switches and their thermal modeling, protection, and drive requirements,
- be able to understand the operating principle of different power converters and their steady-state analysis, draw idealized waveforms, and learn about applications.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction to Power Electronics Switches:** Thyristors, DIAC, TRIAC, GTO, BJT, MOSFET and IGBT, Losses and Cooling, Triggering circuits for Thyristors and MOSFET, Snubber design and protection, Commutation Circuit for Thyristors.	10	Understanding characteristics and operation of semiconductor device for its use as power electronic switch, Estimation of loss and Thermal analysis, Snubber design and Protection mechanism.
2	**AC to DC conversion: Single phase controlled rectifiers:** Phase angle control, Single-phase half-wave controlled rectifier, Single-phase full- wave controlled rectifier, Single-phase half controlled and fully controlled bridge converters, The effect of input source impedance, Dual Converter; **Three phase controlled rectifiers** -- M-3, B-6, Dual converter; applications.	11	Principle of operation, Conceptual drawing of important waveforms and Performance analysis of AC-DC power converter circuits.
3	**DC to DC Converter:** Class A, B, AB, C, D, CD, ABCD Chopper, operating principle and applications; Buck, Boost and Buck-Boost converter operating principle under CCM and DCM and applications;	9	Principle of operation, Conceptual drawing of important waveforms and Analysis of steady state operation of DC-DC power converter circuits.
4	**DC to AC Converter:** Classification of inverter, Single phase and three phase VSI operation, Basic concept of PWM controlled inverter, applications.	9	Principle of operation, Conceptual drawing of important waveforms and Analysis of steady state operation.
5	**AC to AC Converter:** AC voltage controllers. Single and three-phase Cycloconverter circuits, blocked group operation, circulating current mode operation, applications.	3	Principle of operation, Conceptual drawing of important waveforms and Analysis of steady state operation.

Text Books

1. Power Electronics: Converters, Applications, and Design, - Ned Mohan, Tore M. Undeland and William P. Robbins; Wiley.
2. Power Electronics – M. D. Singh and K. B. Khanchandani; McGraw-Hill

Reference Books

1. Power Electronics: Devices, Circuits and Applications- M. H. Rashid, Pearson.