Course Type	Course Code	Name of Course	L	T	P	Credit
DE	EED403	Industrial Power Electronics	3	0	0	9

Course Objective

The objective of this second level course is to know about advanced concepts such as soft switching, resonant converters, PWM techniques, Multilevel converter, Grid integration etc. in the field of power electronics. To develop knowledge towards operation, design and analysis of power converter.

Learning Outcomes

Upon successful completion of this course, students will:

- be able to understand operating characteristics of different advanced power electronic systems and application field,
- be able to undertake analysis, design and development of power electronic systems.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction:** Review of basic concepts, Power electronics Switches: Static Induction Transistors (SITs), MOS-Controlled Thyristor (MCTs), ETO, MTO, SiC and GaN devices, Gate Drive and protection requirements.	6	Understanding characteristics and operation of recent semiconductor device for its use as power electronic switch, its drive circuit requirement and Protection mechanism.
2	**AC-DC Conversion:** Filter design for rectifier circuits, Unity power factor rectifier operation, Diode and Thyristor based multi-pulse rectifier, applications.	6	Understanding operating principle of UPF rectifier and multi-pulse rectifier and Filter design for rectifier circuit.
3	**DC-DC Conversion:** Isolated DC-DC converter topologies, operating principle and application; Review of Series and Parallel Resonnance, Soft Switching in DC-DC Converter, ZCS and ZVS operation, Resonant converter. Design of inductor and high frequency transformer, applications.	15	Principle of operation, Conceptual drawing of important waveforms and Analysis of steady state operation of DC-DC switch mode power converters, Design of high frequency inductor and transformer.
4	**DC-AC Conversion:** PWM techniques for 2-level VSI, unipolar, bipolar, SPWM and SVPWM; Introduction to multilevel inverter, Introduction to CSI and applications.	12	Principle of operation of different PWM strategy, Conceptual drawing of important waveforms and Analysis of steady state operation.
5	**Case study:** Induction Motor drive, Grid connected PV system, Induction & Dielectric Heating.	3	To understand operation of practical systems.

Text Books

1. Power Electronics: Converters, Applications, and Design, - Ned Mohan, Tore M. Undeland and William P. Robbins; Wiley.
2. Power Electronics: Essentials & Applications - L Umanand; Wiley.

Reference Books

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