Techno College of Engineering Agartala

An Engineering College Approved by AICTE, MHRD, Govt. of India
Affiliated to Tripura University (A Central University),
Department of Electrical Engineering

List of Laboratory Experiments

Power Electronics Laboratory							
Course Code	**Hours / Week**				**Maximum Marks**		
PC EE 408	L	T	P	C	**CIA**	**SEE**	**Total**
	0	0	2	1	40	60	100
Number of classes: 24 hours			**Prerequisites: B**asic Electrical Engineering and Power Electronics				
Branch: EE			**Semester: IV**				

Course overview:

The **Power Electronics Laboratory** is designed to provide practical exposure to the operation, characteristics, and applications of power semiconductor devices and converter circuits. Through a series of hands-on experiments, students gain a thorough understanding of the switching behavior of devices like SCR, TRIAC, MOSFET, and IGBT, along with their triggering methods.

The lab emphasizes the design and analysis of various firing circuits (R, RC, and UJT-based) and their implementation in power control applications. Students study the performance of half- and fully-controlled converters for both single-phase and three-phase AC-DC conversion using SCRs. Additionally, experiments include the operation of choppers and thyristorized speed control of DC motors, which are critical in industrial drive systems.

This laboratory enhances students' ability to build, test, and analyze power electronic circuits, preparing them for advanced applications in power conversion and motor control systems.

Course objectives:

i. **To study the VI characteristics of power semiconductor devices** such as SCR, TRIAC, MOSFET, and IGBT.
ii. **To design and analyze different firing circuits** (R, RC, and UJT) for triggering SCRs in controlled applications.
iii. **To evaluate the performance of single-phase and three-phase controlled rectifiers** with resistive and inductive loads.
iv. **To understand the operation of choppers and thyristor-based speed control methods** for DC motor drives.

Course outcomes:

CO Number	CO Description	K-level
CO-1	Demonstrate the characteristics of the Power Semiconductor devices.	K-2
CO-2	Illustrate the different triggering techniques of Power Electronic devices for their applications in Electrical Engineering.	K-2

CO-3	Examine the characteristics of Single and three-phase half and fully controlled Converters.	K-4
CO-4	Apply the use of power electronic based converter circuits in the higher courses of Electrical Engineering.	K-3
Sl. No.	**EXPERIMENT NAME**	**CO**
1.	Study of VI characteristics of SCR	CO1
2.	Study of VI characteristics of TRIAC	CO1
3.	Study of VI characteristics of MOSFET	CO1
4.	Study of VI characteristics of IGBT	CO1
5.	Study of R firing circuits for SCR.	CO2
6.	Study of RC firing circuits for SCR.	CO2
7.	Study of UJT firing circuits for SCR.	CO2
8.	Study of Characteristics of SCR based Half controlled Single Phase Converters with R and RL load	CO3
9.	Study of Characteristics of SCR based Fully controlled Single Phase Converters with R and RL load.	CO3
10.	Study of Characteristics of SCR based Half and Fully controlled Three Phase Converters.	CO3
11.	Study of DC Jones Chopper.	CO4
12.	Study of Thyristorised speed control of a DC motor.	CO4