

POWER ELECTRONICS LABORATORY

Pre-requisites of course: Basic Electrical Engineering, Network Analysis & Synthesis

Course Outcomes:		Knowledge Level, KL
Upon the completion of the course, the student will be able to:		
CO 1	Demonstrate the characteristics and triggering of IGBT, MOSFET, Power transistor and SCR.	K3
CO2	Analyze the performance of single phase fully controlled bridge rectifiers under different loading conditions.	K4
CO3	Develop simulation models of power electronic circuits.	K5

KL- Bloom's Knowledge Level (K₁, K₂, K₃, K₄, K₅, K₆)

K₁ – Remember K₂ – Understand K₃ – Apply K₄ – Analyze K₅ – Evaluate K₆ – Create

Note: Minimum 10 experiments are to be performed from the following list:.

1. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor
2. To study V-I characteristics of SCR and measure latching and holding currents.
3. To compare the R, RC & UJT trigger circuit for SCR.
4. To study the commutation circuit for SCR.
5. To study single phase fully controlled bridge rectifiers with resistive and inductive loads.
6. To study single phase fully controlled bridge rectifiers with DC motor load.
7. To study three-phase fully controlled bridge rectifier with resistive and inductive loads.
8. To study single-phase ac voltage regulator with resistive and inductive loads.
9. To study single phase cyclo-converter
10. To study the four quadrant operation of chopper circuit
11. To study MOSFET/IGBT based single-phase bridge inverter.

Software based experiments (Scilab/MATLAB or any equivalent open source software)

12. To obtain the simulation of single phase half wave controlled rectifier with R and RL load and plot load voltage and load current waveforms.
13. To obtain simulation of single phase fully controlled bridge rectifier and plot load voltage and load current waveform for inductive load.
14. To obtain simulation of single phase full wave ac voltage controller and draw load voltage and load current waveforms for inductive load.
15. To obtain simulation of step down dc chopper with L-C output filter for inductive load and determine steady-state values of output voltage ripples in output voltage and load current.

Text/Reference Books:

1. M.H. Rashid, "Power Electronics: Circuits, Devices & Applications", Pearson Education
2. D.W. Hart, "Introduction to Power Electronics" Prentice Hall Inc.

List of Major Equipment in Power Electronics Lab

- Setup for plotting V-I Characteristics of SCR
- Setup for Single phase midpoint Cycloconverter
- Setup for SCR Phase half controlled half wave bridge rectifier
- Setup for SCR Phase fully controlled bridge rectifier.
- Triggering of (i) IGBT (ii) MOSFET (iii) power transistor setup
- R, RC & UJT trigger circuit for SCR.
- Three-phase fully controlled bridge rectifier with resistive load
- Single-phase ac voltage regulator with resistive and inductive loads.
- Four quadrant operation of chopper circuit