

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
6EIRC1 INDUSTRIAL AND POWER ELECTRONICS	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective:

The course is designed

1. To enable the students to develop hands on experience in analyzing, designing and carrying out experiments on various power converters.
2. To familiarize the switching devices, power converters and its applications in various systems for power control.

Prerequisites (if any): Basic electronics and basic electrical

COURSE CONTENT

UNIT- I: INTRODUCTION TO THYRISTORS

Thyristors – Silicon Controlled Rectifiers (SCR's) - Two transistor analogy - Static and Dynamic characteristics - Turn on and turn off methods - Series and parallel connections of SCR's – Snubber circuit details – Line Commutation and Forced Commutation circuits – Power MOSFET, Power IGBT, their characteristics.

UNIT- II: AC - AC CONVERTERS

AC voltage controllers with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms - Cyclo converters - Types in bridge configuration with R and RL loads.

UNIT-III: DC - AC CONVERTERS

Basics of Inverters – Single phase inverter – Basic series inverter - operation and waveforms - Three phase inverters (120, 180 degrees conduction modes of operation) - Voltage control techniques for inverters, Pulse width modulation techniques.

UNIT- IV: DC - DC CONVERTERS

Choppers – Classification of types of choppers, One, Two and Four quadrant operations, Step up and down choppers; Analysis of Type-A chopper, Single-and two quadrant operation with DC motor load, Derivation of load voltage and currents with R, RL loads.

UNIT-V: Industrial application of Power Electronics

Static switches; Control rectifiers using SCR, SCR as a static switch, Single phase AC power control using DIAC-TRIAC, UJT Triggered SCR power control, solid state relays; Photo electric relay/switch using LDR, LASCR, photodiode, Solid state relay using Opto-TRIAC, Opto-SCR, Opto-transistor.

Course Outcome:

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Choose relevant thyristor for the given application	PO-1, PO-2
CO2	Troubleshoot AC & DC power control circuits employing thyristors	PO-1, PO-2
CO3	Troubleshoot inverter, chopper and cyclo-converters.	PO-1, PO-2
CO4	Use photoelectric devices in relevant applications	PO-1, PO-2
CO5	Use different types of timers in specific applications	PO-1, PO-2
CO6	Maintain induction heating and dielectric heating equipment	

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	2	2										
CO2	2	2										
CO3	2	2										
CO4	2	2										
CO5	2	2										

BOOKS RECOMMENDED:

- [1]. Power Electronics, Dr. P. S. Bimbhra, Khanna Publishers
- [2]. Power Electronics, M. D. Singh & K. B. Kanchandhani, Tata Mc Graw - Hill Publishing Company.
- [3]. Power Electronics; Circuits, Devices and Applications, M. H. Rashid, Prentice Hall of India.
- [4]. Industrial and Power Electronics, Harish C. Rai,