



C.U.SHAH UNIVERSITY

FACULTY OF: - Technology & Engineering

DEPARTMENT OF: -Electrical Engineering

BRANCH: Electrical Engineering

SEMESTER: - V

COURSE:- B.Tech

CODE: - 4TE05PEL1

NAME – Power Electronics-I

Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE05PEL1	Power Electronics-I	4	0	2	6	5	30	1.5	70	3	---	20	30	150

OBJECTIVES

1. To introduce the students to the concepts of various Power electronics circuits namely ac convertor, Dc convertor, Inverter, and Chopper.
2. To study design and implementation of modelling circuits using power electronics components.
3. To study design and simulation of power electronics circuits using components.

PREREQUISITES

1. Basics and fundamental Power Electronics Circuits and Components.

COURSE OUTLINES

Sr. No.	Course Contents	Hours
1	Power Semiconductor Devices: Power semiconductor devices their symbols and static characteristics, characteristics and specification of switches, types of power electronic circuits operation, steady state and switching characteristics and switching limit of power transistor, operation and steady state characteristics of power MOSFET and IGBT, protection of devices, series and parallel operation of thyristors, commutation technique of thyristor, Thyristor: operation and VI characteristics, two transistor model, methods of turn-on operation of GTO, MCT and TRIAC, Thermal modeling and heat sink calculations, triggering circuits, pulse transformer, optical isolation.	12

2	Dc To Dc Converters (Chopper): Introduction to DC-DC converter: Principle of Step Down and Step up converter.	08
3	Phase Controlled Converters: Single phase half wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode. Single phase fully controlled and half controlled bridge converter. Performance parameters of Three phase half wave converters, Three phase fully controlled and half controlled bridge converters, Effect of source impedance Single phase and three phase dual converters.	10
4	Ac Voltage Controllers: Principle of On-off and phase controls, single phase AC voltage controller with resistive and inductive loads, three phase ac voltage controllers(various configurations and comparison only), Single phase transformer taps changer. Cyclo Converters : Basic principle and operation, single phase to single phase, three phase to single phase and three phase to three phase cyclo converters, output voltage equation.	14
5	Inverters: Single phase series resonant inverter, single phase bridge inverters, three phase bridge inverters, voltage control of inverters, harmonics reduction techniques, single phase and three phase current source inverters.	10

Learning Outcomes

After the completion of this course the students would be able to:

1. To design and implement various Power Electronics devices and circuits.
2. Understand of power electronics devices characteristics.
3. Design and basic industrial drives circuits.

Books Recommended

1. M. H. Rashid, "Power Electronics: Circuits, Devices and Applications", Prentice Hall of India Ltd. 3rd Edition, 2004.
2. M. D. Singh and K. B. Khanchandani, "Power Electronics", Tata MC Graw Hill, 2005.
3. V. R. Moorthy, "Power Electoincs: Devices, Circuits and Industrial Applications", Oxford University Press, 2007.
4. M. S. Jamil Asghar, "Power Electronics", Prentice Hall of India Ltd. 2004.
5. Chakrabarti and Rai, "Fundamentals of Power Electronics and Drives", Dhanpath Rai and Sons.
6. Ned Mohan, T. M. Undeland and W. P. Robbins, "Power Electronics: Converters, Applications and Design", Wiley India Ltd., 2008.
7. S. N. Singh, "A text book of power electronics", Dhanpat Rai and Sons.