

Power Electronics

Course Code	19EE3603	Year	III	Semester	II
Course Category	Program Core	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisite	ECA (19EE3301) & ED and AC (19EE3302)
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the basic operation of various power electronic devices and their characteristics, firing scheme, Snubber circuit, series and parallel connections of SCR. (L1)
CO2	Analyze the operation of Rectifiers and Choppers for R, RL Loads. (L4)
CO3	Analyze the operation of Inverters and AC to AC converters for R, RL Loads.(L4)
CO4	Apply the operation to derive the load voltage and current expressions for Rectifiers, Choppers, Inverters and AC to AC converters for R, RL Loads.(L3)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: High, 2: Medium, 1: Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2											1	3	2
CO2	2	2										1	3	2
CO3	2	2										1	3	2
CO4	3	3										1	3	2

Syllabus		
Unit No.	Contents	Mapped CO
I	Power Semiconductor Switches: Power Diode, Power IGBT, GTO, DIAC, Principle of operation and characteristics. Principle of operation of SCR, static, dynamic and gate Characteristics of SCR, Two-Transistor analogy of SCR, Triggering methods of SCR, Cosine firing scheme, Snubber Circuit, series and parallel connections of SCRs–static and dynamic equalizing networks, specifications and ratings of SCRs .	CO1
II	AC –DC Converters(Rectifiers): Phase angle control, single phase half wave and full wave(mid point) controlled rectifiers with R and RL load, half controlled (symmetrical configuration) and fully controlled bridge rectifiers with R, RL loads - effect of source inductance. Three phase half and fully controlled bridge converters- with R and RL loads, effect of source inductance, dual converters (both single phase and three phase).	CO2 CO4

III	DC to AC Converters (Inverters): Series Inverter and Parallel Inverter single phase full bridge inverters, comparison between VSI & CSI, three phase VSI (180 & 120-degree conduction modes). Introduction to Multi level Inverters-Cascaded H Bridge inverter (principle of operation). Voltage control techniques for inverters: Pulse-width modulation techniques - single pulse, multi-pulse, sinusoidal pulse width modulation techniques.	CO3 CO4
IV	DC to DC Converters (Choppers) – Control strategies of chopper, Buck, Boost, Buck-boost choppers- Derivation of average load voltage and current expressions, Four quadrant chopper (principle of operation), AC chopper .	CO2 CO4
V	AC to AC converters (AC Voltage controllers and Cyclo-converters) : Two SCR's in anti parallel with R and RL loads, derivation of RMS load voltage, current and power factor. Cyclo converters – single phase mid-point and bridge type cyclo converters with resistive and inductive load. (Principle of operation).	CO3 CO4
Learning Resources		
Text Books		
<ol style="list-style-type: none"> 1. P.S. Bhimbra, 'Power Electronics', 5th edition, Khanna Publications 2. M. H. Rashid, 'Power Electronic Circuits Devices and Applications', 4th edition, Pearson . 3. M.D. Singh and K.B. Kanchandani , 'Power Electronics', 2nd edition , McGraw Hill Publications, 		
Reference Books		
<ol style="list-style-type: none"> 1. Ned Mohan, Tore M. Undeland, and William P. Robbins, "Power Electronics Converters Applications and Design", 3rd edition, McGraw-Hill Education. 2. P.C. Sen Power Electronics , 2nd edition Tata Mc Graw-Hill Publishing 3. Vedam Subramanyam , 'Power Electronics-Devices Converter Applications', 2nd edition, New Age International (P) Limited . 		
e- Resources & other digital material		
<ol style="list-style-type: none"> 1. www.nptel.ac.in/courses/108101038/ 		