EE-502: Power Electronics

Credit	L	T	P
3	**2**	**1**	**-**

UNIT-I
Introduction, Devices: Diodes-silicon, fast recovery, Schottky diode, SCR,TRIAC, SCS, GTO, PUT, SUS, CUJT, LASCR, Mosfet, IGBT with their V-I characteristics. SCR: Operating principle, Gate Characteristics, Two transistor model, over-current and over voltage protection,snubber circuits, methods of turning on (triggering) and turning off (commutation).

UNIT-II
Half-wave and full-wave controlled rectifiers with resistive and reactive load,battery load Freewheeling diode. Detailed derivation of rms, average value, harmonic factor, displacement factor, THD, crest factor. Three phase half wave and full wave controlled rectifiers. Effect of Source impedance.

UNIT-III
Voltage-driven inverter, current-driven inverter, Single-phase inverter with resistive load, inductive load: Bridge, Parallel, Centre tapped. Mc-Murrey-Bedford inverter,Zero current switching(ZCS), Zero voltage Switching (ZVS). Introduction of resonant inverters. Three phase bridge inverter, 120-180 degree conduction.

UNIT-IV
Principle of chopper, Step down-Step up chopper, Step down chopper with RL load without linear approximation, Chopper classification: First Quadrant, Second Quadrant, Third and Fourth Quadrant, Fourth Quadrant, All Four Quadrant Chopper. Buck, Boost, Buck-boost DC-DC converters. Morgan and Jones Chopper.

UNIT-V
AC Voltage Controllers: Single and three phase ac voltage controllers. Cycloconverters: Singlephaseto single-phase, three-phase to single-phase, three-phase to three-phase cyclo-converter circuit and their operation. Various PWM Techniques.

Additional topics:

Control Analysis of Converters
Simulation using PSIM

TEXT/REFFERENCE BOOKS

1. M. H. Rashid, “Introduction to Power Electronics”, Pearson Education India, New Delhi.
2. Reference book names + websites
3. P. C. Sen, “Power Electronics” Tata McGraw Hill Book Co., New Delhi.
4. G. K. Dubey, S.R. Doradla, A.Joshi and R.M.K. Sinha, “Thyristorised Power Controllers” Wiley Eastern Ltd., New Delhi.

Websites

www.nptel.ac.in
www.electricalcircuits.com