

Unit 1

P 10

Power diodes, Enhancement of reverse blocking capacity, reverse recovery silicon controlled rectifier (SCR) structure, I-V characteristics, turn ON and turn OFF characteristics, ratings, control circuits design and protection circuits. Gate turn-off thyristor (GTO), I-V characteristics, turn ON, turn OFF characteristics, limitation of power handling capability, GTO snubber consideration, power MOSFETs, operation modes, switching characteristics, power BJT, second breakdown, saturation and quasi saturation state.

Unit 2

P 10

Basic structure, working and V-I characteristic of Diac and Triac, application of a diac as a triggering device for a triac. Insulated Gate Bipolar Transistors (IGBT) Basic structure, I-V Characteristics, switching characteristics, device limitations and safe operating area (SOA) etc.

Application of SCR: SCR as a static switch phase controlled rectification, half wave full wave and bridge rectifiers with inductive non-inductive loads; Analysis for a single phase supply, idea of three phase supply AC voltage control using SCR and Triac as a switch.

Unit 3

P 12

Power Inverters and DC Choppers: Need for commutating circuits and their various types, d.c. link invertors parallel capacitors commutated invertors with and without reactive feedback and its analysis, Series Invertors and its improved version, bridge invertors.

Unit 4

P 8

Choppers: Use of an SCR as a d.c. switch, the parallel capacitor commutated d.c. switch triggering circuits for d.c. switches, operation of d.c. chopper circuits using B-type commutating circuit, (ii) cathode pulse turn-off of SCR, Morgan's chopper.

Essential Texts

1 "Power Electronics Circuits, Devices and Applications", 3rd Edtn., by M.H. Rashid, PEARSON EDUCATION

2 "Power Electronics, Converter, Applications and Design by Ned Mohan, Tore.

### Practicals –Power Electronics

1. To study the I-V characteristics of DIAC
2. To study the I-V characteristics of a TRIAC
3. To study the I-V characteristics of a SCR
4. SCR as a half wave and full wave rectifiers.
5. DC motor control using SCR.
6. DC motor control using TRIAC.
7. To use UJT as a trigger for TRIAC.
8. To study parallel and bridge inverter.