

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN POWER ELECTRONICS

Semester: 4

Subject Name **ELEMENTS OF POWER ELECTRONICS**

Sr.No	Course content
1.	BASIC OF POWER ELECTRONICS 1.1 Concept of power electronics. 1.2 Typical power electronics system. 1.3 Power semiconductor devices. 1.4 Power electronics converters classification.
2.	POWER SEMICONDUCTOR DIODES 2.1 Construction, Characteristics and ratings of Diode 2.2 Types of power diodes and its ratings: General purpose diodes, Fast recovery diodes, Schottky diodes, Silicon carbide diode.
3.	THYRISTOR FAMILY AND SUPPORTING DEVICES 3.1 Construction, characteristics and ratings of SCR, TRIAC, LASCR 3.2 Fast switching thyristor 3.3 Construction and characteristics of UJT, PUT, DIAC 3.4 Construction, characteristics and ratings of BCT, RCT, GTO, MTO, MCT, IGCT, SITH, FCT, GATT 3.5 SCR Turn ON and Commutation methods 3.6 Ratings of an SCR 3.7 Series and parallel operation of SCR
4.	POWER TRANSISTORS 4.1 Construction, characteristics and ratings of BJT, Power MOSFET, SIT, IGBT 4.2 Series and parallel operation of power transistor. 4.3 di/dt and dv/dt limitations of transistor. 4.4 Driving circuits for power transistors (BJT, MOSFET, IGBT) 4.5 Comparison between thyristor and transistor.
5.	POWER ELECTRONICS CONVERTERS 5.1 AC to DC Converters, Types, various circuits, working and waveforms 5.2 AC to AC Converters, Types, various circuits, working and waveforms 5.3 DC to DC Converters, Types, various circuits, working and waveforms 5.4 DC to AC Converters, Types, various circuits, working and waveforms

6.	PROTECTION, GATE AND BASE DRIVE CIRCUITS USED IN POWER ELECTRONICS. 6.1 Causes of failure in power circuits. 6.2 Over voltage and over current protection techniques. 6.3 Function of snubber circuits. 6.4 Snubber circuits for Diodes, Thyristors, Transistors and their working. 6.5 Function of gate/base drive circuits. 6.6 Different types of gate and base drive circuits available for power devices.
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LIST OF LABORATORY EXPERIMENTS:

1. To verify the characteristics of various diodes.
2. To verify the characteristics of SCR.
3. To verify characteristics of DIAC.
4. To verify characteristics of UJT.
5. To verify characteristics of TRIAC.
6. To measure latching and holding current of SCR.
7. To observe series operation of SCR.
8. To observe parallel operation of SCR.
9. To verify characteristics of BJT.
10. To observe operation of BJT as switch.
11. To verify characteristics of Power MOSFET.
12. To study controlled rectifiers.
13. To study AC to AC converter.
14. To study DC to DC converter.
15. To study DC to AC converter.

Reference Books:

1. Power electronics - By M. D. Singh & K. B. Khanchandani, TMH.
2. Power electronics devices, circuits and applications – By V. R. MOORTHY, Oxford University Press.
3. Power electronics-By K. Hari Babu, SciTech Publications.
4. Power electronics - By Dr. P. S. Bimbhra, Khanna Publishers.
5. Power electronics circuits, devices and application – By Muhammad H. Rashid, PHI.
6. Power electronics- By N. Mohan, T. Undeland & W. Robbins, John Wiley & Sons, Inc.
7. Power electronics principles and applications –By Joseph Vithayathil, McGraw Hill.