

EI8077 POWER ELECTRONICS AND DRIVES

DETAILED SYLLABUS

UNIT I POWER SEMICONDUCTOR DEVICES AND CHARACTERISTICS

Operating principle and switching Characteristics: Power diodes, Power BJT, Power MOSFET, IGBT, SCR, TRIAC, GTO, MCT, Power integrated circuits (PIC) – Drive and Protection circuits – Series and parallel operation – Commutation – Simulation tools.

UNIT II CONTROLLED RECTIFIERS AND AC CONTROLLERS

Single phase – Three phase – Half controlled – Fully controlled rectifiers – Dual converters -Effect of source and load inductance - AC voltage controllers –Introduction to Cyclo converters, Matrix converters.

UNIT III DC TO DC CONVERTERS

Step up and Step down Chopper – Chopper classification - quadrant of operation – Switching mode Regulators – Buck, Boost, Buck-Boost, and Cuk Regulators.

UNIT IV INVERTERS

Voltage source Inverters – Half bridge – Full bridge – Three Phase Bridge Inverters – Voltage control– PWM Techniques – Current Source Inverters: Capacitor Commutated Inverter- Resonant inverters: Series, Parallel, ZVS, ZCS – Introduction to multilevel Inverters.

UNIT V DRIVES AND CONTROL

Static and Dynamic equations of dc and ac machines – Electrical breaking – Rectifier and chopper control of DC drives – Principles of v/f control of AC drives – Open loop and Closed loop schemes for DC and AC drives(Block diagram approach only) – Introduction to vector control of AC drives.

TEXT BOOKS:

1. Rashid, M.H., “Power Electronics – Circuits, Devices and Applications”, PHI, 3rd Edition, 2004.

For Notes, Syllabus, Question Papers and many More

2. Mohan, Udeland and Robbins., "Power Electronics", John Wiley and Sons, New York, 1995.

REFERENCES:

1. Singh, M.D., and Khanchandani, K.B., "Power Electronics", 2nd Edition., Tata McGraw-Hill, 2011.

2. Bose, B.K., "Modern Power Electronics and AC Drives", Pearson Education, 2002.

3. Bimbira, P.S., "Power Electronics", Khanna Publishers, 2006.

4. Moorthi, V.R., "Power Electronics - Devices, Circuits and Industrial Applications", Oxford University Press, 2005.

5. NPTEL Lecture Series on "Power Electronics" by Dr.B.G.Fernandes, IIT Bombay.

OBJECTIVES

- Comprehensive introduction to various power electronic devices, their structure, operating principle and characteristics
- Give exposure to Various topologies, working principle and analysis of controlled rectifiers and ac controllers
- Detailed knowledge on Classifications, structure, operating principle of dc choppers
- Introduction to different types of Inverters , their principle of operation and waveform control
- Overview on dc and ac drives and their control using power electronic circuits.