20PE001 - EMERGING POWER ELECTRONIC DEVICES AND CONVERTERS

UNIT-I
Modern Power Semiconductor Devices:
Modern power semiconductor devices – MOS turn Off Thyristor (MTO) – Emitter Turn off Thyristor (ETO) – Integrated Gate-Commutated thyristor (IGCTs) – MOS-controlled Thyristors (MCTs) – Insulated Gate Bipolar Transistor (IGBT) – MOSFET – comparison of their features.

UNIT-II
Phase Controlled Rectifiers:
Introduction– Half controlled and Fully controlled converters –harmonic analysis —power factor Improvement -single phase series converters –Numerical problems. Three phase converters – Half controlled and fully controlled converters – harmonic analysis — power factor Improvement – twelve pulse converter– dual converters – Numerical problems.

UNIT-III
PWM Techniques:
Single PWM – Multiple PWM – sinusoidal PWM – modified PWM – phase displacement Control – Advanced modulation techniques for improved performance – Trapezoidal, staircase, stepped, harmonic injection and delta modulations – Advantage – application. Third Harmonic PWM – 60 degree PWM – space vector modulation – Comparison of PWM techniques – harmonic reductions.

UNIT-IV
Multilevel Inverters:
Two level voltage source inverter – Multilevel concept – Classification of multilevel inverters – Diode clamped multilevel inverter – principle of operation – main features – improved diode Clamped inverter – principle of operation – Flying capacitors multilevel inverter – principle of operation – main features. Cascaded multilevel inverter – principle of operation – main features – Multilevel inverter applications – reactive power compensation – back to back intertie system – adjustable drives – Switching device currents – de link capacitor voltage balancing – features of Multilevel inverters – comparisons of multilevel converters.

UNIT-V
AC/AC Converters:
Three phase AC voltage controllers – Analysis of controllers with star and delta Connected loads–applications–numerical problems. Three phase to three phase cycloconverters – analysis of Midpoint and bridge configurations – Limitations – Advantages – Applications – numerical problems.