EE 503: ADVANCED POWER CONVERTERS (3-0-0: 3)

Single-phase and three-phase controlled rectifiers: average output voltages and currents for R-L load, performance parameters.

Analysis and design of DC-DC Converters: Buck, Boost, Buck-boost and Cuk converters – topology, voltage transfer ratio, current and voltage waveforms, voltage and current ripple, modeling in the state space method.

DC-AC converters: Single phase and three phase bridge inverters, PWM switching scheme, unipolar and bipolar switching scheme, space vector modulation (SVPWM), Reduction of harmonics, output voltage control.

Resonant Converters: principle of soft switching – concept of zero current switching (ZCS) and zero voltage switching (ZVS).

Introduction to digital control application to power electronic circuits, digital current mode control, basic digital current control implementation and digital voltage mode control.

Text Books & References

1. M H Rashid, “Power Electronics, Circuits, Devices, Application”.
2. B K Bose, “Modern Power Electronics and AC Drives”.
3. L Umanand, “Power Electronics Essentials and Applications”, Wiley India.
4. Ned Mohan, T M Undeland, “Power Electronics Converters, Applications and Design”, John Willey.
5. Singh M D, Khanchandani K B, “Power Electronics”, Tata McGraw-Hill publishing Co. Ltd.
6. Agarwal J P, “Power Electronic Systems: Theory and Design”, Addison Wesley Longman Ptc. Ltd.