

CONTROL TECHNIQUES IN POWER ELECTRONICS

Module-1

Voltage and current commutated choppers, buck converter, boost converter, Cuk converter. Three-phase ac regulators, Single-phase and three-phase Cyclo-converters, Line commutated and forced commutated inverters, three phase voltage source inverters, voltage and frequency control. PWM converters: Single-pulse and multiple pulse modulation techniques. Multi-pulse converters using delta/ zigzag/ Fork /Polygon transformers, analysis and harmonic calculations..

Module-2

High quality single-phase and three-phase converters control techniques, Buck, Boost control, Power, flow control, hysteresis and carrier wave control, space vector control. Multi-level converters control techniques. Conventional methods of power factor improvement techniques, controlled free-wheeling operation, asymmetrical triggering, sequence control of phase controlled converters, extinction angle control;

Module-3

State space modeling and simulation of linear systems, Discrete time models, Conventional controller using small signal models, Fuzzy control, Hysteresis Controllers, Output and state feedback switching controller. Sliding mode control. Direct and indirect control of buck, cuk, boost Converters.

Module-4

Digital Control Circuits for Power Electronics Systems . Analog Versus Digital Control Circuit. Causal and Noncausal Circuits. LTI Discrete-Time Circuits. Digital Filters. Hard Real-Time Control Systems. Multirate Control Circuits.

Text Books/References:

- Mohan N., Undeland T. M. and Robbins W. P., "Power Electronics- Converters, Applications and Design", 3rd 2008 Ed., Wiley India.
- Murphy J.M.D., Turnbull F.G., "Power Electronics Control of AC Motors", Pergamon Press, New York.
- Kazmierkowski M. P., Krishnan R. and Blaabjerg F., "Control in Power Electronics – Selected Problems", Academic Press.
- Krzysztof Sozanski, "Digital Signal Processing in Power Electronics Control Circuits" ., Springer, London.
- H. S. Ramírez and R. S.-Ortigoza, "Control Design Techniques in Power Electronics Devices" . Springer, London.