ADVANCED ELECTRICAL DRIVES

Module I(10 Hours)

Principles for vector and field-oriented control-Complex-valued dq-model of induction machines. Turns ratio and modified dq-models. Principles for field-oriented vector control of ac machines. Current controllers in stationary and synchronous coordinates. Rotor-flux oriented control of current-regulated induction machine.

Module II(10 Hours)

Dynamic model of IM in rotor-flux coordinates. Indirect rotor-flux oriented control of IM - Direct rotor-flux oriented control of IM.- Methods to estimation of rotor-flux Generalized flux-vector control using current- and voltage decoupling networks. Generalized flux-vector oriented control. Current and voltage decoupling networks.Airgap-oriented control. Voltage-fed vector control. Stator-flux oriented vector control.

Module III(11 Hours) Parameter sensitivity, selection of flux level, and field weakening - Parameter detuning in steady-state operation. Parameter detuning during dynamics.Selection of flux level. Control strategies for used in the over-speed region .

Module IV(15 Hours) Principles for speed sensor-less control - Principles for speed sensor-less control. Sensor-less methods for scalar control. Sensor-less methods for vector control .Introduction to observer-based techniques . Direct torque control Induction Motor Drives. Self control synchronous motor drives. Introduction to speed control of switched reluctance machine. Control of Permanent magnet synchronous machine, Brushless dc Machine, Surface Permanent Magnet Machine and interior.

Text/References:

1. B. K. Bose, Modern Power Electronics and A.C. Drives, PHI, 2002.

2. G. K. Dubey, Power Semiconductor Controlled Drives, Prentice-Hall International, 1989.

Supplementary Reading:

1. G. K. Dubey, Fundamentals of Electrical Drives, Narosa Publishing House, 2002.

2. W. Leonhard, Control of Electrical drives, Springer-Verlag, 1985.

3. P.C. Sen,Thyristor DC Drives,Wiley-Interscience Pub., Digitized on Dec, 2006.