

# Advanced Electric Drives - Video course

## COURSE OUTLINE

The first course on electric drives usually introduces the concept of control of electric motors for various types of mechanical loads. In the first course, mainly the dc motor control (both steady state and dynamic), and steady state torque and speed control of ac motors are emphasized.

The present course "Advanced electric drives" focuses on the dynamic control of dc and ac motor from solid state converters for better torque and speed response. Initially, the dynamic models of the dc and ac motors are developed that will be useful in understanding the dynamic control.

Advanced control techniques are applied to optimize the performance of ac motor drives. Since majority of modern drives are ac motor drives, the course centers around the control of ac motor drives. Finally, control aspects of some special motors, such as permanent magnet synchronous motor, brushless dc motor, switched reluctance motor, etc. are presented.

### Contents:

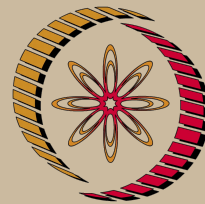
Generalized theory of electric machines, Kron's primitive machine, modeling of dc machines, induction machine, synchronous machine, scalar and vector control of induction machine, direct torque and flux control of induction machine, sensorless control and flux observers.

Self controlled synchronous motor, unity power factor operation, vector control of synchronous motor, cycloconverter-fed synchronous motor drive.

Permanent magnet synchronous motor drive, brushless dc motor drive, switched reluctance motor drive, stepper motors.

## COURSE DETAIL

Sl. No	Topic	No. of Hours
1	Generalized theory and Kron's primitive machine model	02
2	Modeling of dc machines Modeling of induction machine Modeling of synchronous machine Reference frame theory and per unit system	02 02 03 01
3	Control of Induction Motor Drive Scalar control of induction motor Principle of vector control and field orientation Sensorless control and flux observers Direct torque and flux control of induction motor Multilevel converter-fed induction motor drive Utility friendly induction motor drive	02 03 03 02 01 01
4	Control of Synchronous Motor Self controlled synchronous motor Vector control of synchronous motor	02 02



NP-TEL

# NPTEL

<http://nptel.iitm.ac.in>

## Electrical Engineering

### Pre-requisites:

1. Electrical Machines, Power Electronics.

### Coordinators:

**Dr. S.P. Das**  
Department of Electrical Engineering IIT Kanpur

	Cycloconverter-fed synchronous motor drive Control of synchronous reluctance motor	02 02
5	Control of Special Electric Machines Permanent magnet synchronous motor Brushless dc motor Switched reluctance motor Stepper motors and control	03 02 02 03
	<b>Total</b>	<b>40</b>

**References:**

Reference Books:

1. P.C. Krause, O. Wasynczuk, and S. D. Sudhoff, "Analysis of Electric Machinery", McGraw-Hill Book Company.
2. R. Krishnan, "Electric Motor Drives: Modeling, Analysis and Control", Prentice Hall.
3. P. S. Bhimbra, "Generalized Theory of Electric Machines", Khanna Publication.
4. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Education.