

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NEED509	Advanced Machine Drives	3	0	0	3

Course Objective
<ul style="list-style-type: none"> <li>Review the concepts and basic operation of electric drive systems. Understand closed loop operation of dc, induction and synchronous machine drives. Understand the design techniques of drive systems. However, strong fundamental knowledge about power electronics, electrical drives and their interfacing are the prerequisite for the course.</li> </ul>
Learning Outcomes
<ul style="list-style-type: none"> <li>At the end of the semester students will gather knowledge about the functioning, control and orientation of various types of machine drives</li> </ul>

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	<b>Introduction:</b> Generalized theory and Kron's primitive machine model.	4L	Comprehensive introduction about the course content will be delivered. Basics required to understand Drives using generalized theory will be discussed.
2	<b>Modelling of Machines:</b> Modelling of dc machines, modelling of induction machine, modelling of synchronous machine, Reference frame theory and per unit system.	8L	Modelling of different types of rotating machined using generalized theory of machine will be discussed along with details of reference frame and per unit system.
3	<b>AC Motor Drive:</b> Scalar control of AC motor, Principle of vector control and field orientation.	7L	Students will learn the Scalar & Vector control of AC motor Drive.
4	<b>Control of Induction Motor Drive:</b> Sensor-less control and flux observers, Direct torque and flux control of induction motor, Multilevel converter-fed induction motor drive and Utility friendly induction motor drive.	8L	Students will learn in detail about different control mechanisms of motor drives. Their relative merits/demerits will be presented.
5	<b>Control of Synchronous Motor Drive:</b> Self-controlled synchronous motor, Vector control of synchronous motor, Control of synchronous reluctance motor.	8L	Details related to control of different types of synchronous motor drives will be discussed.
6	<b>Control of Special Electric Machines Drives:</b> Permanent magnet synchronous motor, Brushless dc motor, Switched reluctance motor, Stepper motors and control.	7L	Control mechanism of few special purpose machine drives will be discussed.
<b>Total Contact Hours</b>		<b>42L</b>	

#### Text Books:

1. G.K. Dubey, "Fundamentals of Electrical Drives", Narosa Publ.
2. P.S. Bhimbra, "Generalized Theory of Electrical Machines", Khanna Pub.

#### Reference Books:

1. Bimal K Bose, "Modern Power Electronics and AC Drives", Prentice Hall.
2. Paul C. Krause, Oleg Wasynczuk, Scott D. Sudhoff, "Analysis of Electric Machinery and Drive Systems", Wiley, 2nd Ed.