

Course Learning Objectives: First Course on Electric Drives

1. Describe the structure of Electric Drive systems and their role in various applications such as flexible production systems, energy conservation, renewable energy, transportation etc., making Electric Drives an enabling technology.
2. Understand basic requirements placed by mechanical systems on electric drives.
3. Review phasors and three-phase electric circuits.
4. Understand the basic principles of power electronics in drives using switch-mode converters and pulse width modulation to synthesize the voltages in dc and ac motor drives.
5. Understand the basic concepts of magnetic circuits as applied to electric machines.
6. Understand the two basic principles (generation of force and emf) that govern electromechanical energy conversion.
7. Describe the operation of dc motor drives to satisfy four-quadrant operation to meet mechanical load requirements.
8. Design torque, speed and position controller of motor drives.
9. Clearly learn to use space vectors presented on a physical basis to describe the operation of an ac machine.
10. Understand the basic principles of Permanent Magnet AC (Self-Synchronous AC) drives.
11. Describe the operation of induction machines in steady state that allows them to be controlled in induction-motor drives.
12. Learn speed control of induction motor drives in an energy efficient manner using power electronics.
13. Learn the basic operation of stepper motors and switched-reluctance motor drives.
14. Get an appreciation of power quality issues in powering electric drives.
15. Appreciate how the use of space vectors, introduced here in this first course on a physical basis, easily explains vector control of ac drives in the next course.

Textbook: Electric Drives: An Integrative Approach, Ned Mohan, Year 2003,
www.MNPERE.com.