

IAGE-318: Advanced Electrical Drives

(2 Credits: 50 Marks)

Course Outcomes:

On completion of the course, students should be able to –

1	Understand the various drive mechanisms and methods for energy conservation.
2	Apply power electronic converters to control the speed of DC motors and induction motors.
3	Evaluate the motor and power converter for a specific application.
4	Develop closed loop control strategies of drives.

Course Contents:

Module -I: Electrical Drives- An Introduction

(5 Hrs)

Introduction to electric drives: Electrical Drives, Advantages of Electric drives, Parts of Electrical Drives, Electric Motors, Power Modulators, Sources, Control Module, Choice of Electric Drives and Losses.

Module –II: Dynamics of electrical drives

(7 Hrs)

Dynamics of electrical drives: Fundamental torque equation, components of load torque, load characteristics, modified torque equation, speed-torque convention & multi-quadrant operation. Equivalent values of drive parameters, load with rotational motion, loads with translational motion, measurement of moment of inertia, components of load torques, Nature and classification of load torque. Calculation of time and energy loss in transient operation, steady state stability, loads equalization.

Module -III: Control of electrical drives

(6 Hrs)

Control of electrical drives: Modes of operation, speed control and drive classifications, closed loop control of drives. DC Motor Drives: Starting, Braking, Speed control of DC motors using single phase fully controlled and half controlled rectifiers. Three phases fully controlled and half controlled converter fed DC motor drives. Chopper controlled DC drives.

Module – IV: Induction Motor Drives**(7 Hrs)**

Induction Motor Drives: Speed control using pole changing, stator voltage control, AC voltage controllers. Variable frequency and variable voltage control from inverter. Different types of braking, dynamic, regenerative and plugging.

Energy Conservation in Electric Drives: Losses in Electric drive systems, measurement of Energy conservation in Electric drives. Use of efficient converters, energy efficient operation of drives, Improvement of p.f., improvement of quality of supply, maintenance of motors

Module – V: Tutorials, assignments and presentation based on Module I to IV

References:

1. Vedam Subramanyam: Electric Drives Concepts & Applications –Tata McGraw Hill Edn. Pvt.Ltd, Second edition 2011
2. Gopal K Dubey; 2001; Fundamentals of Electrical Drives (SECOND EDITION); Narosa Publishing House; New Delhi (India)
3. Nisit K.De and Prashanta K.Sen: Electric Drives, PHI., 2001
4. V. Subrahmanyam: Thyristor Control of Electric Drives, Tata McGraw Hill Edn. Pvt.Ltd, 2010.
5. Werner Leonhard: Control of Electric Drives, Springer international edition 2001
6. Nisit K.De and Swapan K.Dutta: Electric Machines and Electric Drives, PHI learning Pvt. Ltd 2011.