

NIRMA UNIVERSITY
Institute of Technology
B. Tech. in Electrical Engineering
Semester – V

L	T	P	C
2	0	2	3

Course Code	2EEDE51
Course Title	DC Drives

Course Outcomes (COs):

At the end of the course, students will be able to –

1. interpret performance of dc motor drives based on converter topology
2. analyze different control circuits of dc motor drives
3. analyze dc drive circuits for various applications
4. simulate and analyze performance of dc drives

Syllabus:

Teaching Hours: 30

Unit-1: D.C. Motor Drives

12

Analysis of separately excited dc motor with continuous and discontinuous mode of operations, closed loop control of dc motor drives, analysis of dc series motor drives, single-phase and three-phase controlled rectifier fed dc motors, dual converter fed drives, reversible drives, Performance characteristics and analysis of chopper fed dc motors, motoring and braking operations, phase locked loop control of dc drives

Unit-2: PMDC Motor Drives

06

Single-phase and three-phase rectifier fed PMDC motors, chopper fed PMDC motors, PWM rectifier fed PMDC motors

Unit-3: Stepper Motor Drives

06

Definitions and types of stepper motors, control of variable reluctance (VR) stepper motors, micro stepping control of stepper motor, control of permanent magnet (PM) stepper motors, control of hybrid stepper motor, different topologies of converters and motor drivers

Unit-4: Servo Motor Drives

06

Servo motor types, construction and operation of servo motors, schematic and control of Servo motor drive, different topologies of converters and motor drivers, applications

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

This shall consist of at least 10 laboratory experiments / simulations based on the syllabus.

Suggested Readings:

1. G. K. Dubey, Fundamental of Electrical Drives, Narosa Publication.
2. V. Subrahmanyam, Electric Drives– concepts and applications, Tata McGraw Hill.
3. R. Krishnanan, Electric Motor Drives: Modelling, Analysis and Control, Pearson Publications.
4. Miller T. J. E., Brushless Permanent Magnet and Reluctance Motor Drives, Clarendon Press.
5. V. V. Athani, “Stepper Motors: Fundamentals, Applications and Design”, New Age International Pvt. Ltd.
6. Y. Dote and S. Kinoshita, “Brushless Servomotors-Fundamentals and Applications”, Clarendon Press, Oxford.
7. P. C. Sen, “Principles of Electric Machines and Power Electronics”, Wiley.
8. Ned Mohan, “Electric Machines and Drives: A First Course”, Wiley.
9. Recent publications from reputed journals

L = Lecture, T = Tutorial, P = Practical, C = Credit

w.e.f. academic year 2020-21 and onwards