



MANIPAL UNIVERSITY JAIPUR

School of Automobile Mechanical and Mechatronics Engineering

Department of Mechatronics Engineering
Course Hand-out

Electrical Drives & Machines| MC 1608 | 3 Credits

Session: Jan- May 2019 | Faculty: Ashok Kumar Kumawat

Course Outcomes: At the end of the course, students will be able to

- MCI608.1** Describe the construction and working operation of power electronic devices such as SCR, IGBT etc.
- MCI608.2** Analysis and working operation of various types of converters such as dc-dc, ac-ac, ac-dc, dc-ac.
- MCI608.3** Ability to understand the components of electrical drives and dynamics of electrical drives.
- MCI608.4** Develop design knowledge on how to design the speed control loops for DC Motor and AC motor and hence develop employability skills.
- MCI608.5** Ability to develop about selection criteria of motor power ratings.
- MCI608.6** To learn about working and applications of special motors.

A. SYLLABUS

Introduction to semiconductor devices: SCR, GTO, IGBT, etc. Electric Motors: DC Motors: construction, principle, types, speed-torque characteristics, starting, speed control, AC Motors: Asynchronous motors: review of Induction Motors; Synchronous Motors: construction, principle, types, starting, speed control, Electric Drives: Components of electric drives, factors affecting choice of drives, dynamics of electrical drives, fundamental torque equation, speed-torque conventions, multi-quadrant operation of electric drives, load torque components, nature and classification of load torque, equivalent moment of inertia, steady state stability, load equalization; Determination of motor power rating, motor duty cycles; Electric braking, Power Modulators: Power semiconductor switches: power diodes, SCR, power transistor, IGBT, MOSFETs; Power converters: ac to ac, ac to dc, dc to ac, dc to dc. Special Machines: Stepper Motors, Brushless DC Motors, Permanent Magnet Synchronous Motor, Synchronous Reluctance Motors, Universal Motors, Linear motors – LIM, LSM.

B. TEXT BOOKS

- i. G. K. Dubey, Fundamentals of Electric Drives, Narosa publications, 2nd edition, 2001.
- ii. Power Electronics: Circuits, Devices and Applications, Pearson Education, 2014
- iii. I. J. Nagrath and D. P. Kothari, Electric Machines, Tata McGraw Hill, New Delhi, 4th edition, 2010
- iv. J. D. Edwards, Electrical Machines and Drives, Macmillan publications, UK, 3rd edition, 1991.
- v. P.S. Bimbhra, Power Electronics, Khanna Publishers, 2012.

