5th Semester	REL5D004	ELECTRIC DRIVES	L-T-P 3-0-0	3 Credits

ELECTRIC DRIVES

MODULE I **(10 HOURS)**

Requirements, AC and DC drives, Advantages of Electrical Drives, Fundamentals of Torque Equations, Speed Torque Conventions and Multi-quadrant Operation, Equivalent Values of Drive Parameters, Components of Load Torques, Calculation of Time and Energy Loss in Transient Operations, Steady State Stability, Load Equalization, Control of Electrical Drives, Thermal Model of Motor for Heating and Cooling, Classes of Motor Duty, Determination of Motor Rating.

MODULE II **(10 HOURS)**

Steady State Performance of DC/AC Drives:DC Motors and their Performances, Starting,Braking, Transient Analysis, Speed Control, Methods of Armature Voltage Control, Controlled Rectifier Fed DC Drives, Induction Motor Drives: Speed Control, Pole Changing, PoleAmplitude Modulation, Stator Voltage Control, Variable Frequency Control from Voltage Source, Voltage Source Inverter Control, Variable Frequency Control from Current Source,Current Source Inverter Control, Current Regulated Voltage Source Inverter Control, RotorResistance Control, Slip Power Recovery.

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MODULE III **(10 HOURS)**

Synchronous Motor Drives: Synchronous Motor Variable Speed Drives, VariableFrequency Control of Multiple Synchronous Motors. Electric Traction: System of electrictraction Mechanics of Train Movement: Speed- time, distance- time and simplified speed-timecurves, Attractive effort for acceleration and propulsion, effective weight, train resistance,adhesive weight, specific energy output and consumption. Traction Motors: Review of characteristics of different types of DC and AC motors usedin traction and their suitability

MODULE IV **(10 HOURS)**

Drives for specific application like Textile Mills, Steel Rolling Mills, Cranes and HoistDrives, Cement Mills, Sugar Mills, Machine Tools, Paper Mills, Coal Mines, Centrifugal Pumps.Application Areas and Functions of Microprocessors in Drive Technology.

Books:

[1] G. K. Dubey," Fundamentals of Electrical Drives", CRC Press, 2002.
[2] V.Subrahmanyam, "Electric Drives",TMH

[3] W. Leonhard," Control of Electric Drives", Springer Science & Business Media, 2001.
[4] R. Krishnan," Electric Motor Drives: Modeling, Analysis and Control", Prentice Hall 2001.

Digital Learning Resources:

Course Name: Fundamentals of Electric Drives
Course Link: https://nptel.ac.in/courses/108/104/108104140/
Course Instructor: Prof. Shyama Prasad Das, IIT Kanpur