



# FUNDAMENTALS OF ELECTRIC DRIVES

## PROF. SHYAMA PRASAD DAS

Department of Electrical Engineering  
IIT Kanpur

**PRE-REQUISITES :** Electrical Machines, Power Electronics

**INTENDED AUDIENCE :** Senior UG and PG students in Electrical Engg

**INDUSTRY SUPPORT :** GE Global Research, Bangalore, Hitachi Hi-Rel Power Electronics Pvt Ltd, Gandhinagar, Amtech Electronics (India) Ltd., Gandhinagar

### COURSE OUTLINE :

The course aims at giving a broad overview of Electrical Drive Systems. It is assumed that the students have prior exposure to Electrical Machines and Power Electronics. The control principles of various DC and AC motors using solid state converters are discussed. Principles of selection of Electric Motors are introduced. Some of the applications of Electrical Drives are also highlighted.

### ABOUT INSTRUCTOR :

Prof. S. P. Das received the B.Tech. (with honors) degree in Electrical Engineering, the M.Tech. degree in 'Machine Drive and Power Electronics' and the Ph.D. degree from the Indian Institute of Technology, Kharagpur, India, in 1990, 1992, and 1997, respectively. He has been with the Department of Electrical Engineering, IIT Kanpur since 1997. He has guided about 7 PhD theses and over 50 M.Tech theses. His research interests include power electronics, high performance industrial drives, power quality conditioners, and microprocessor-based control and instrumentation. He is a Senior Member of IEEE (USA) and a Fellow of Institute of Electronics and Telecom Engineers (IETE), India.

### COURSE PLAN :

**Week 1:** Introduction to Electrical Drives Dynamics of Electrical Drives Review of Torque-Speed Characteristics of DC Motor Drives

**Week 2:** Solid-state Control of DC Motor Drives Controlled Rectifier-fed DC Drives

**Week 3:** Chopper Controlled DC Drives

**Week 4:** Induction Motor Drives Operation of Induction Motor with Unbalanced Source Voltages Analysis of Induction Motor from Non-sinusoidal Voltage Supply Starting and Braking of Induction Motor

**Week 5:** Variable Voltage/ Current, Variable Frequency Control of Induction Motor Fed from VSI and CSI Control of Slip-ring Induction Motor

**Week 6:** Synchronous and Brushless DC Motor Drives

**Week 7:** Traction Drives

**Week 8:** Stepper Motor and Switched Reluctance Motor Drives