

# 20PE002 - ELECTRIC DRIVES

## UNIT - I

### Rectifier Control of DC Drives

Principle of phase control–Fundamental relations; Analysis of separately excited DC motor with single-phase and three-phase converters–waveforms, performance parameters, performance characteristics. Continuous and discontinuous armature current operations; Current ripple and its effect on performance; Operation with freewheeling diode; Implementation of braking schemes; Drive employing dual converter.

## UNIT - II

### Chopper Control of DC Drives

Introduction to time ratio control and frequency modulation; Class A, B, C, D and E chopper controlled DC motor–performance analysis, multi quadrant control, chopper based implementation of braking schemes; Multi-phase chopper; Related problems.

## UNIT – III

### Control of Induction Motor Drives-Stator Side and Rotor Side

AC voltage controller circuit, six step inverter voltage control, closed loop variable frequency PWM inverter with dynamic braking, CSI fed variable frequency drives- comparison. Static rotor resistance control, injection of voltage in the rotor circuit, static scherbius drives, power factor considerations, modified Kramer drives.

## UNIT – IV

### Field Oriented Control of Induction Motor Drives

Field oriented control of induction machines–theory. DC drive analogy, Direct and Indirect methods, Flux vector estimation, Direct torque control of Induction Machines–torque expression with stator and rotor fluxes, DTC control strategy.

## UNIT – V

### Synchronous Motor Drives (09 hours)

Wound field cylindrical rotor motor–Equivalent circuits, performance equations for operation from a voltage source, starting and braking, V curves. Self-control, margin angle control, torque control, power factor control. Brushless excitation systems

### TEXT BOOKS:

1. P.C Sen, *Thyristor DC Drives*, John Wiley and sons, New York, 1981
2. Gopal K Dubey, *Power Semiconductor controlled Drives*, Prentice Hall Inc., New Jersey, 1989
3. Gopal K.Dubey, *Fundamentals of Electrical Drives*, 2<sup>nd</sup> Edition, Narosa Publishing House, New Delhi, 2009
4. Bimal K Bose, *Modern Power Electronics and AC Drives*, Pearson Education Asia, 2002.

### REFERENCE BOOKS:

1. R.Krishnan, *Electric Motor Drives–Modeling, Analysis and Control*, Prentice-Hall of India Pvt. Ltd., New Delhi, 2010.
2. VedamSubramanyam, *Electric Drives–Concepts and Applications*, TataMcGraw-Hill publishing company Ltd., New Delhi, 2002
3. W.Leonhard, *Control of Electrical Drives*, Narosa Publishing House, 1992
4. Murphy J.M.D and Turnbull, *Thyristor Control of AC Motors*, Pergamon Press, Oxford, 1988.