SOLID STATE CONTROL OF AC DRIVES

Course Code: 13EE2211   **L P C**
                                                    4 0 3

Pre requisites: Power Electronics and Power Electronics & Drives

Course Educational Objectives:.
The Student shall be exposed to Control of AC Drives and Modeling & Simulation of AC Drives with different Controllers

Course Outcomes: After Completion of the Course, the Student will be able to
1. Understand the Operation and Control of AC Drives
2. Model and Simulate the AC Drives.
3. Analyze different Scalar Control Methods
4. Analyze the current Fed Inverter control methods.
5. Analyze the equations governing the Vector Control

UNIT-I
INTRODUCTION & VOLTAGE SOURCE INVERTER FED INDUCTION MOTOR DRIVES:
Review of steady-state operation of Induction motor, Equivalent circuit analysis, torque-speed characteristics. Scalar control- Voltage fed Inverter control-Open loop volts/Hz control-Speed control with slip regulation-Speed control with torque and Flux control-Current controlled voltage fed Inverter Drive.

UNIT-II
CURRENT SOURCE INVERTER FED INDUCTION MOTOR DRIVES & SLIP POWER RECOVERY SCHEMES:
Current-Fed Inverter control-Independent current and frequency control-Speed and flux control in Current-Fed Inverter drive-Volts/Hz control of Current-Fed Inverter drive-Efficiency optimization control by flux program, Slip

Power Recovery Drives-Static Kramer Drive-Phasor Diagram-Torque Expression-Speed Control of Kramer Drive-Static Scherbius Drive-Modes of Operation.

31

GVPCE(A)   M.Tech. Power Electronics & Drives | **2013**

UNIT-III
VECTOR CONTROL OF INDUCTION MOTOR: Principles of vector control, Direct vector control, derivation of indirect vector control, implementation block diagram; estimation of flux, flux weakening operation.

UNIT-IV
CONTROL OF SYNCHRONOUS MOTOR DRIVES: Synchronous motor and its characteristics- Control strategies Constant torque angle control- power factor control, constant flux control, flux weakening operation, Load commutated inverter fed synchronous motor drive, motoring and regeneration, phasor diagrams.

UNIT-V
PMSM DRIVES & VARIABLE RELUCTANCE MOTOR DRIVE: Characteristics of permanent magnet, synchronous machines with permanent magnet, vector control of PMSM- Motor model and control scheme. Variable Reluctance motor drives- Torque production in the variable reluctance motor -Drive characteristics and control principles Current control variable reluctance motor servo drive

TEXT BOOK:
1. B. K. Bose, "*Modern Power Electronics and AC Drives*", Pearson Publications- 2008. (Chapter 1,2)

2. R. Krishnan, "*Electric Motor Drives Modeling, Analysis &control*", Pearson Education, 2008. (Chapter 3,4,5)

REFERENCE BOOKS:

1. MD Murphy & FG Turn Bull "*Power Electronics control of AC Motors*" Pergman Press, 1st Edition, 1998.

2. G.K. Dubey" *Fundamentals of Electrical Drives*", Narosa Publications, 1995.

3. G.K. Dubey, "*Power Semiconductor drives*", Prentice hall.