

(EE502) POWER ELECTRONIC CONTROL OF AC DRIVES

Objective of the Course :

To impart knowledge on operation and performance of I.M., Synchronous motors and brushless DC motor and their speed control techniques.

UNIT – 1

AC Machines for Drives:

Induction Machines- torque production – equivalent circuit analysis – speed torque characteristics with variable voltage operation, variable frequency operation, constant v/f operation – variable stator current operation – induction motor characteristics in constant torque and field weakening regions.

UNIT – II

Control and Estimation of Induction Motor Drives

Scalar control-voltage fed inverter control- open-loop volts/Hz control-speed control slip regulation – speed control with torque and flux control current controlled voltage fed inverter drive – 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 -Slip power recovery drives – static Kramer Drive – Phasor diagram- torque expression – speed control of a Kramer Drive – Static Scheribus Drive – modes of operation.

UNIT – III

Vector or Field Oriented Control of Induction motor drives:

DC Drive Analogy-Principles of Vector control-vector control methods – direct vector control – indirect vector control.

UNIT – IV

Control and Estimation of synchronous motor drives:

Synchronous motor and its characteristics – control strategies – constant torque angle control-unity power factor control constant mutual flux linkage control- Flux weakening operation – maximum speed – direct flux weakening algorithm – constant torque mode controller – flux weakening controller – indirect flux weakening – maximum permissible torque – speed control scheme – implementation strategy – speed controller design.

UNIT – V

Brushless DC motor drives:

Three-phase full wave brush less dc motor – sinusoidal type of brush less dc motor – current controlled brushless dc motor servo drive.

REFERENCE BOOKS:

1. B.K. Bose, "Modern Power Electronics and AC drives", 1st ed., Pearson publications
2. R. Krishnan, "Electric motor drives Modeling, Analysis and Control", 1st ed., Pearson Publications , 2002
3. B.K. Bose, "Power Electronics and AC drives", Prentice Hall.
4. M.H. Rashid, "Power electronic circuits, Devices and applications", PHI, 1995
5. G.K. Dubey, "Fundamentals of Electrical drives", Narora publications, 1995
6. B.K. Bose, "Power Electronics and Variable frequency drives", 1st ed, IEEE Press Standard publications 2002.