POWER ELECTRONIC CONVERTER FED DRIVES

Course Code: 13EE1117
L T P C
4 1 0 3

Pre requisites: Power Electronics, Electrical Machines – I and II.

Course Educational Objectives:
To familiarize the student with:

✦ AC and DC drives that find wide application in industry.
✦ Control of DC motor drives fed from three phase converters and choppers.
✦ Control of AC motor drives with variable frequency and voltage converters.

Course Outcomes:
After completion of this course the students acquire knowledge in:

✦ Control of DC motor drive fed from chopper and three phase converter
✦ Various speed control methods of induction motor drives
✦ Control of synchronous motor drive.

UNIT-I (13 Lectures)
AN INTRODUCTION TO INDUSTRIAL DRIVES:
Electrical Drives, Advantages of Electrical drives, Parts of Electrical Drives, Choice of electrical Drives, Status of ac and dc drives, Fundamental torque equation, multi-quadrant operation, Components of load torques, Nature and classification of load torques, Braking of DC motor-Dynamic braking, plugging and regenerative braking

CONTROL OF DC MOTORS BY THREE PHASE CONVERTERS:
Three phase semi and fully controlled converters connected to D.C. separately excited and D.C series motors, Output voltage and current
waveforms, Speed and Torque expressions, Speed – Torque characteristics, Numerical problems, Four quadrant operation of D.C motors by dual converters, Closed loop operation of DC motor (Block Diagram only).

UNIT-II (12 Lectures)
CONTROL OF CHOPPER-FED DC MOTORS:
Single quadrant, Two quadrant and four quadrant chopper fed dc separately excited and series excited motors, Continuous current operation, Output voltage and current wave forms, Speed torque expressions, Speed-torque characteristics, Problems on Chopper fed D.C Motors, Closed loop operation ( Block Diagram Only).

UNIT-III (13 Lectures)
INDUCTION MOTOR DRIVES AND SPEED CONTROL THROUGH STATOR VOLTAGE:
Three phase Induction motor-analysis and performance, Braking-Plugging, Dynamic braking, Speed Control of Induction motor using AC voltage controllers; Soft starting an induction motor, Speed-torque characteristics, Numerical problems.

UNIT-IV (12 Lectures)
CONTROL OF INDUCTION MOTOR THROUGH STATOR FREQUENCY:
Variable frequency characteristics, Variable frequency control of induction motor by voltage source and current source inverter, PWM control, Comparison of VSI and CSI operations, Speed torque characteristics, Numerical problems on induction motor drives, Closed loop operation of induction motor drives (Block Diagram Only).

CONTROL OF INDUCTION MOTOR FROM ROTOR SIDE:
Static rotor resistance control-rotor resistance variation in slip ring Induction motor using a chopper, Slip power recovery scheme, Static Scherbius drive, Static Kramer Drive, their performance and speed torque characteristics, Advantages, Applications, Numerical problems.

UNIT-V (13 Lectures)
CONTROL OF SYNCHRONOUS MOTORS:
Separate control & self control of synchronous motors, Operation of self
controlled synchronous motors by VSI & CSI, Load commutated CSI fed Synchronous Motor, Operation, Waveforms, Speed-torque characteristics, Applications, Advantages and Numerical Problems, Closed-loop control operation of synchronous motor drives (Block Diagram Only), Variable frequency control, Cyclo-converter, PWM, VFI, CSI.

**TEXT BOOKS:**


**REFERENCES:**