DYNAMICS OF ELECTRICAL MACHINES

Course Code: 15EE2205

Pre requisites: Electrical Machines.

Course Outcomes:
At the end of the course, a student will be able to:
CO1: Derive Kron’s Primitive machine as an unified electrical machine model.
CO2: Derive the mathematical model of a separately excited DC motor & DC Series Motor.
CO3: Analyze a three phase synchronous/ PM machine under transient conditions.
CO4: Derive the mathematical model and control a 3- phase Induction motor under transient /steady state conditions.
CO5: Analyze asymmetrical 2-phase / 1-phase induction motor under transient /steady state conditions.

UNIT-I
MODELING CONCEPTS
Basic Two-pole machine representation of commutator machines, 3-phase synchronous machine without damper bars and 3-phase induction machine, Kron’s primitive machine-voltage, current and torque equations. Real time model of a two phase induction machine-transformation to obtain constant matrices-three phase to two phase transformation- power invariance.

UNIT-II
REFERENCE FRAME THEORY & PM AC MACHINE
PM AC Machine: Voltage & Torque equations in Machine Variables and Rotor Reference Frame Variables

UNIT-III  (10-Lectures)
DC MACHINE MODELLING
Mathematical model of a separately excited DC motor- Steady state and transient analyses - Transfer function of a separately excited DC machine – Mathematical model of a DC series motor, shunt motor-linearization techniques for small perturbations

UNIT-IV  (10-Lectures)
DYNAMIC ANALYSIS OF SYNCHRONOUS MACHINE

UNIT-V  (10-Lectures)
MODELING OF THREE PHASE SYMMETRICAL INDUCTION MACHINE

TEXT BOOKS:
1. Dr. P. S. Bimbhra, “Generalized Theory of Electrical Machines” – Fifth edition, Khanna publishers (for UNIT- I: Chapters 1 & 2)

REFERENCES: