(EE501) MACHINE MODELLING & ANALYSIS

Objective of the Course :

The student learns the mathematical modelling of electrical machines.

UNIT - I

Introduction:

Elements of generalized theory: Essentials of rotating electrical machines- conventions-Basic two Pole machine-representation of DC and three phase AC machines-Transformer and speed voltages in the armature – Kron's primitive machine – voltage equations – expression for power – Torque.

UNIT - II

Linear transformations in machines-invariance of power Transformation from a displaced brush axis – Transformation from three phases to two phases (a,b,c to a,b,0)-power invariance – transformation from rotating axes (a,b,0) to stationary axes (d,q,0) – park's transformation – physical concepts.

UNIT - III

Mathematical model of separately excited, series, shunt and compound DC motors transfer functions of separately excited DC motor – equations in state variable form computation of dynamic characteristics.

UNIT - IV

Three phase induction motor: circuit model-winding inductances-flux linkages-voltage equations-transformation to equivalent two phase representation – equations in the stator frame – equations in rotor reference frame - equations in synchronously rotating frame – expression for Torque equations in state variable form – equations for sinusoidal voltages–equivalent circuit of the induction motor.

UNIT - V

Synchronous motor – circuit model of a three –phase synchronous motor winding inductances – flux linkages voltage equations–parkstransformation to d,q,0 variables – direct and quadrature–axes Synchronous inductances and zero sequence inductance – voltage quations in steady state and phasor representation – expression for Torque power angle characteristic of salient pole motor.

REFERENCE BOOKS:

1. Vedam Subramanyam, "Thyristor control of Electric Drives"

2. Paul C.Krause, Oleg wasynezuk, Scott D. Sudhoff, "Analysis of electric machinery and Drive systems"