

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

Electrical Engineering

Subject Name : Power System Dynamics & Control (Power Group)

Sr No.	Course Content
1.	Generator Modeling - I (Machine Viewpoint): Classical Machine Description, Voltage Generation, Open-Circuit Voltage, Armature Reaction, Terminal Voltage, Power Delivered by Generator, Synchronizing Generator to an Infinite Bus, Synchronous Condenser, Role of Synchronous Machine Excitation in Controlling Reactive Power.
2	Generator Modeling – II (Circuit Viewpoint): Energy Conversion, Application to Synchronous Machine, The Park Transformation, Park's Voltage Equation, Park's Mechanical Equation, Circuit Model, Instantaneous Power Output, Applications, Synchronous Operation, Steady-state Model, Simplified Dynamic Model, Generator Connected to Infinite Bus (Linier Model).
3	Excitation and Prime Mover Controllers: Excitation System, Excitation System Modeling, Excitation System – Standard Block Diagram, System Representation by State Equation, Prime Mover Control System.
4	Transmission Lines, SVC and Loads: Transmission Lines, D-Q Transmission using $\alpha - \beta$ Variables, Static VAR Compensators, Loads.
5	Dynamics of a Synchronous Generator Connected to Infinite Bus: System Model, Synchronous Machine Model, Application of Model 1.1, Calculation of Initial Conditions, System Simulation, Consideration of Other Machine Model, Inclusion of SVC Model.
6	Analysis of Single Machine System: Small Signal Analysis with Block Diagram Representation, Characteristic Equation (CE) and Application of Routh-Hurwithz Criteion, Synchronizing and Damping Torque Analysis, Small Signal Model : State Equation, Nonlinear Oscillations – Hopf Bifurcation.
7	Analysis of Multi-machine System: Simplified system Model, Detailed models: Case I, Detailed models: Case II, Inclusion of Load and SVC dynamics, Modal Analysis of Large Power Systems, Case Studies.

Reference Books :

1. Power Systems Analysis By Vijay Vittal, Bergen , Pearson Education
2. Power System Dynamics By K R Padiyar, B S Publications
3. Power System Stability & Control, By- P.Kundur,Tata Mcgraw hill
4. www.ee.iitb.ac.in/~peps/downloads.html