Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Master of Engineering Semester II

(Electrical Power System)

(With effect from Academic Year 2017-18 (CBCS))

Subject Code: MEEE203-N	Subject Title: Power System Dynamics & Control
Pre-requisite	Power system modeling & simulation

A. Course Objective:

- To study steady state and dynamic modeling of generator.
- To study dynamic modeling of Excitation Systems, Prime movers etc.
- To study response of SMIB and multi-machine systems for different cases.

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
04	00	02	06	05	03	70	30	20	30	150

B. **Outline of the Course:**

Sr. No	Title of the Unit	Minimum Hours
1	**Modelling of Generator**	16
2	**Modelling of Excitaion System:**	10
3	**Dynamics of a Synchronous Generator**:	10
4	**Single machine system Modeling:**	10
5	**Multi-machine System:**	14

Total Hours (Theory): 60

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Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weightage(%)
1	**Modelling of Generator:** 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, 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	**16**	**30**
2	**Modelling of Excitaion System:** Excitation System, Excitation System Modeling, Excitation System – Standard Block Diagram, System Representation by State Equation, Prime Mover Control System.	**10**	**10**
3	**Dynamics of a Synchronous Generator**: System Model, Synchronous Machine Model, Application of Model, Calculation of Initial Conditions, System Simulation, Consideration of Other Machine Model, Inclusion of SVC Model.	**10**	**20**
4	**Single machine system Modeling:** 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.	**10**	**20**
5	**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.	**14**	**20**
	Total	**60**	**100**

C. Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, which may carries five marks in overall evaluation.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carries a weight age of five marks in the overall internal evaluation.

- Surprise tests/Quizzes/Seminar /Tutorial may be conducted and having share of five marks in the overall internal evaluation.

D. Learning Outcome

On successful completion of the course

- The student can identify problems related to multi-machine system and modeling of components of power system. Student should be able to implement different modeling techniques through simulation in power system.

E. Text Books & Reference Books:

- Power Systems Analysis By Vijay Vittal, Bergen , Pearson Education
- Power System Dynamics By K R Padiyar, B S Publications
- Power System Stability & Control, By- P.Kundur,TataMcgraw hill
- P.Sauer & M.A. Pai, 'Power System Dynamic & Stability, Prentice Hall Publication.
- www.**ee**.**iitb**.ac.in/~peps/**download**s.html