SCHEME OF COURSE WORK

Course Details:

Course Title	**POWER SYSTEM STABILITY**		
Course Code	**15EE2107**	**L P C**	**3 0 3**
Program:	**Master of Technology.**		
Specialization:	**Power System and Control Automation**		
Semester	**II**		
Prerequisites	**Power system operation and control, Electrical Machines**		
Courses to which it is a prerequisite	**Research**		

Course Outcomes (COs):

1	Understand and classify power system stability and analyze single machine connected to Infinite bus system.
2	Analyze response to small disturbances.
3	Apply Park's transformation to model synchronous machine.
4	Assess the excitation systems.
5	Analyze voltage stability

Program Outcomes (POs):

A graduate of Electrical & Electronics Engineering will be able to

1	Acquire in depth knowledge in the area of power system control and automation.
2	attain the ability to think critically and analyze complex engineering problems related to power system control and automation
3	Obtain the capability of problem solving and original thinking to arrive at feasible and optimal solutions considering societal and environmental factors
4	Extract information through literature survey and apply appropriate research methodologies, techniques and tools to solve power system problems.
5	Use the state-of-the-art tools for modelling, simulation and analysis of problems related to power systems
6	Attain the capability to contribute positively to collaborative and multidisciplinary research to achieve common goals
7	Demonstrate knowledge and understanding of power system engineering and management principles and apply the same for efficiently carrying out projects with due consideration to economical and financial factors.
8	Communicate confidently, make effective presentations and write good reports with engineering community and society
9	Recognize the need for life-long learning and have the ability to do it independently
10	Become socially responsible and follow ethical practices to contribute to the community for sustainable development of society.
11	Independently observe and examine critically the outcomes of his actions and reflect on to make corrective measures subsequently and move forward positively by learning through mistakes

Course Outcome Versus **Program Outcomes:**

COs\POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO-1	S	S	S	S	S	M	W	M	M	W	W
CO-2	S	S	S	S	S	M	S	S	W	M	M
CO-3	S	S	S	S	S	M	M	W	W	W	M
CO-4	S	S	S	M	M	W	W	W	W	W	W

S - Strongly correlated, *M - Moderately* correlated, *W-Weakly correlated*

Assessment Methods:	Assignment / Quiz / Seminar / Group Discussions / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Definition of stability, Classification of stability, Rotor angle stability, frequency stability, voltage stability, mid-term and long-term stability,	CO-1	Explain the classical model of one machine connected to infinite bus.	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 8 -9)
2	elementary model, swing equation, power angle equations,	CO-1	Derive swing equation	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 8 -9)
3,4	Natural frequency of oscillations, single machine infinite bus system, equal area criterion, classical model of multi machines system.	CO-2	Derive classical model of multi machines system.	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 8 -9)
5,6	Response to small disturbances: The unregulated synchronous machine, modes of oscillations of an unregulated multi machine system,	CO-1,2	Discuss about the stability of unregulated synchronous machine using swing equation.	▫ Lecture through Black Board & LCD ▫ Problem solving	Seminar/Mid Test (Week 8 -9)
7	Regulated synchronous machine, Distribution of power impacts.	CO-2		▫ Lecture through Black Board & LCD Problem solving	Seminar/Mid Test (Week 8 -9)
8	Mid-Test 1				Week 9
9	Synchronous Machine: Parks transformation, Flux Linkage Equations, voltage equations,	CO-3	Derive voltage equations of synchronous machine using parks transformation	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 15-16)
10	Equivalent circuit of synchronous machine, the flux linkage state-space model- voltage equations, torque equation.	CO-3	Give a detailed dynamic performance comparison of SVC & STATCOM	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 15-16)
11	Excitation Systems: Simplified view of excitation control, control configuration, Typical Excitation configurations- primitive systems, excitation control systems with alternator and with compound, Voltage regulators. Computer representation of excitation systems-Types	CO-4	Derive the approximate model of the complete exciter.	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 15-16)
12	Effect of Excitation on Stability: Effect of excitation on - Power limits, Transient stability, Dynamic stability. Approximate excitation system representation, supplementary stabilizing signals, block diagram of a simplified model of a complete system.	CO-5	Derive the block diagram of simplified model	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 15-16)
13	Voltage Stability: Introduction, Comparison of angle and voltage stability, reactive power flow and voltage collapse,	CO-5	Compare angle and voltage stability	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 15-16)

14	Mathematical formulation, voltage stability analysis, prevention of voltage collapse.			▫ Lecture through Black Board & LCD Discussion	
15	**STUDENTS SEMINAR**				Seminar (Week 15)
16	**Mid-Test 2**				Week 16
	END EXAM				