SCHEME OF COURSE WORK

Course Details:

Course Title	**MODELLING OF POWER SYSTEM COMPONENTS**						
Course Code	**15EE2105**	**L**	**T**	**P**	**C**	**3**	**1**	**0**	**3**
Program	**M.Tech.**						
Specialization	**Power System and Control Automation**						
Semester	**I**						
Prerequisites	**Electrical Machines, Power Systems**						
Courses to which it is a prerequisite	**Power System Design**						

Course Outcomes (CO's):

CO 1	Analyze synchronous machine dynamics.
CO 2	Analyze and model a synchronous machine.
CO 3	Analyze and model an Exciter and Turbine.
CO 4	Analyze and model System Load.
CO 5	Analyze Stability Studies.

Program Outcomes (POs):

A graduate of M.Tech (PSCA) will be able to

1	Acquire in depth knowledge in the area of power system control and automation.
2	Attain the ability to prepare models with respect to any kind of problem on hand and try to solve 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	Have sufficient knowledge base, sufficient to apply the techniques and tools to solve power system problems.
5	Use the state-of-the-art tools for modeling, 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 to 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 and move forward positively.

Course Outcomes versus Program Outcomes:

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11
CO 1			**M**	**S**							
CO 2		**S**			**S**		**M**				
CO 3		**S**			**S**		**M**				
CO 4		**S**			**S**		**M**				
CO 5	**M**		**M**	**S**				**S**			

S - Strongly correlated**, M -** Moderately correlated**, Blank -** No correlation

Assessment Methods	**Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam**

Teaching-Learning and Evaluation

Week	**Topic / Contents**	**Course Outcomes**	**Sample Questions**	**Teaching-Learning Strategy**	**Assessment Method & Schedule**
1	**SYNCHRONOUS MACHINE ANALYSIS** Representation of Synchronous Machine Dynamics	CO-1		Lecture	Assignment (Week-2)
2	Stator and rotor winding voltage equations and flux linkages	CO-1		Lecture Problem solving	
3	Synchronous Machine Dynamics in Synchronous Reference Frame	CO-1	Park's Transformation	Lecture Problem solving	
4	Per Unit Representation, Stator and rotor winding voltage equations and flux linkage equations in per units	CO-1	Selection of base values for rotor circuits	Lecture Problem solving	Quiz (Week 4)
5	**MODELING OF SYNCHRONOUS MACHINE** Sub transient and transient reactance	CO-2		Lecture Problem solving	Assignment (Week-6)
6	Open circuit sub-transient and transient time constants, Effect of saturation on synchronous Machine Modeling	CO-2	Magnetic saturation	Lecture Problem solving	
7	Estimation of Synchronous Machine Parameters through Operational Impedance	CO-2	Operational Parameters	Lecture Problem solving	
8	**MODELING OF EXCITER AND TURBINE** Exciter, IEEE Type DC1A	CO-3		Lecture	Assignment (Week-10)
9	**MID TEST - 1**	CO-1 & CO-2			

10	Model of Turbine - Hydro Turbine, Steam Turbine	CO-3	Turbine Models	Lecture Problem solving	
11	Turbine governor	CO-3		Lecture Problem solving	
12	**MODELLING OF SYSTEM LOAD** Load Representation	CO-4		Lecture Problem solving	Assignment (Week-13)
13	Static load representation	CO-4		Lecture Problem solving	
14	Model of synchronous motor, Model of induction motor.	CO-4	Induction Motors	Lecture	Quiz (Week-14)
15	**MODELLING CORELATED TO STABILITY STUDIES** Steady State Condition	CO-5		Lecture	Assignment (Week-16)
16	Multi-Machine System Representation, Special case of impedance loads	CO-5	Multi-Machine Systems	Lecture Problem solving	
17	Sub-transient Model with Stator and Network Transients Neglected	CO-5	Sub-Transient Model	Lecture Problem solving	
18	**MID TEST - 2**	CO-3, CO-4 & CO-5			
19/20	**END EXAM**				