SCHEME OF COURSE WORK

Course Details:

Course Title	**: FLEXIBLE AC TRANSMISSION SYSTEMS**		
Course Code	**: 13EE2215**	**L P C**	**: 4 0 3**
Program:	**: Master of Technology.**		
Specialization:	**: Power Electronics & Drives**		
Semester	**: II**		
Prerequisites	**: Power Electronics and Power Systems**		
Courses to which it is a prerequisite	**: Research**		

Course Outcomes (COs): After Completion of the course the student will be able to

1	Understand the operation of different FACTS devices.
2	Select the Controller for different Contingencies.
3	Analyze the different FACTS devices in different stability conditions.
4	Select a appropriate FACTS device for a particular Contingency.

Program Outcomes (POs):

A graduate of Electrical & Electronics Engineering will be able to

1	Be a professional workforce in the area of Static Power Electronics Converters and power electronic converter fed electrical drives and power quality issues.
2	Apply soft computing techniques for Power Electronic Systems and Electric Drives.
3	Understand large scale Power Electronic Converter Systems, Electric Drives and issues involved through modeling, analysis and simulation.
4	Apply present day techniques and tools to solve Power electronic and electric drives problems relevant to india and other countries.
5	By using state-of-the-art simulation tools such as PLEXIM, SABER, OPAL-RT Lab, dSPACE, MULTISIM , LABVIEW and other Tools.
6	Collaborate with industries on problems of relevance to them while formulating graduate dissertations.
7	Improvise soft skills to students through seminars and organization of technology workshops, writing research/project reports as a part of graduate education
8	Engage in life-long learning through professional bodies such as IEEE. Institute of Engineers (India) ,etc.
9	Imbibe social responsibilities and ethical practices prevailing in a society through professional institutions.

Course Outcome Versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO-1	S	S	S	S	S	M	S	S	W
CO-2	S	S	S	S	S	S	S	S	W
CO-3	S	S	M	S	S	S	S	S	W
CO-4	S	S	M	S	S	S	S	S	W

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	Transmission interconnections power flow in an AC system, loading capability limits. Dynamic Stability Considerations. Importance of Controllable parameters.	CO-1	Explain the dynamic Stability Considerations of FACTS Devices Explain the Power Flow in an AC Network	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 9-10)
2	Basic types of FACTS controllers, Benefits from FACTS controllers.	CO-1	What are the different Types of FACTS Devices Benefits of FACTS devices	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 9-10)
3	Basic Concept of VSC Single Phase Full Bridge Operation Square Wave Voltage Harmonic for Single Phase Full Bridge	CO-1	Explain Single Phase Bridge converter operation in detail with Diagrams	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 9-10)
4	Three level voltage source converter pulse width modulation converter	CO-1	What is the difference between the two level and three level VSC and explain in detail Explain Three Level Voltage Sourced Converters Explain different Pulse width Modulation Techniques Uesd	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 9-10)
5	Single phase three phase full wave bridge converter transformer connections for 12 pulse 24 and 48 pulse operation	CO-1	Explain in detail the Transformer Connections in 12,24 and 48 Pulse operation with Diagrams	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 9-10)
6	Basic concept of current source Converters in detail	CO-1	Explain the Basic concept of current source Converters in detail wrt Turn off devices	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 9-10)
7	comparison of current source converters with voltage source converters	CO-1	comparison of current source converters with voltage source converters with necessary equations and diagrams	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 9-10)
8	Objectives of Shunt Compensation. Midpoint Voltage Regulation. Voltage Instability Prevention, Improvement of transient stability. Power oscillation damping.	CO-3	Define the Term Compensation and what are the Objectives of Shunt Compensations How a shunt Controller can Compensate for Voltage Instability Prevention, Improvement of transient stability and Power oscillation damping.	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 9-10)
9	Seminar by the Students				Seminar (Week 9)
10	Mid-Test 1				Week -10
11	Methods of controllable VAR generation. 1. Variable Impedance Type Static VAR Generators	CO-4	Explain about Variable Type of VAR Generators	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 17-18)
12	1. Switching Converter Type VAR Generators 2. Hybrid VAR Generators.	CO-4	Explain about Switching Type of VAR Generators Explain about Hybrid Type of VAR Generators	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 17-18)
13	SVC and STATCOM The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping operating point control and summary of compensator control.	CO-3	Explain SVC and STATCOM wrt its Regulation Slope, Transfer Function and Dynamic performance Explain SVC and STATCOM wrt its VAR reserve	▫ Lecture through Black Board & LCD ▫ Discussion	Seminar/Mid Test (Week 17-18)
14	Comparison of SVC and STATCOM Concept of series capacitive compensation. Improvement of Transient Stability. Power oscillation and damping, sub-synchronous oscillation damping.	CO-3	Compare of SVC and STATCOM wrt its Perforance Define the Term Compensation and what are the Objectives of Series Compensations How a Series Controllers improve Transient Stability, Power	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 17-18)

			Oscillations damping and sub-synchronous Resonance		
15	Functional requirements of GTO Thyristor Controlled Series Capacitor(GCSC), Thyristor Switched Series Capacitor(TSSC)	CO-2	Explain the Functional requirements of GTO Thyristor Controlled Series Capacitor(GCSC), Thyristor Switched Series Capacitor(TSSC)	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 17-18)
16	Thyristor Controlled Series Capacitor(TCSC) control schemes for GCSC TSSC and TCSC	CO-2	Explain about the control Schemes of GCSC,TSSC and TCSC	▫ Lecture through Black Board & LCD Discussion	Seminar/Mid Test (Week 17-18)
17	STUDENTS SEMINAR				Seminar (Week 18)
18	Mid-Test 2				Week-19
19/20	END EXAM				Week-20