



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: MEEE202-N	Subject Title: Flexible AC Transmission System
Pre-requisite	

A. Course Objective:

- Understand the operations of different FACTS devices.
- Select the controllers for different Contingencies.
- Analyze the different FACTS devices in different stability conditions.
- Select an appropriate FACTS device for a particular application.

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	Introduction	06
2	Conventional Reactive-Power Compensators	12
3	SVC Voltage Control	12
4	Series Compensators	20
5	Emerging FACTS Controllers	10

Total Hours (Theory): 60

Total Hours (Lab): 30

Total Hours: 90



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Detailed Syllabus

Sr. No.o	Topic	Lecture Hours	Weight age(%)
1	Introduction: Background., Electrical Transmission Networks., Conventional Control , Mechanisms., Flexible ac Transmission Systems (FACTS), Emerging Transmission Networks, Reactive Power, Uncompensated Transmission Lines, Passive Compensation	06	10%
2	Conventional Reactive-Power Compensators: Synchronous Condensers , The Saturated Reactor (SR) , The Thyristor-Controlled Reactor (TCR) , The Thyristor-Controlled Transformer (TCT), Thristor-Controlled Reactor (MSC-TCR) , ,The Thyristor-Switched capacitor-Thyristor-Controlled Reactor (TSC-TCR).	12	20%
3	SVC Voltage Control: Voltage Control, Effect of Network Resonances on the Controller Response, The 2nd Harmonic Interaction between the SVC and ac Network, Application of the SVC to Series-Compensated ac Systems, 3 rd Harmonic Distortion, Voltage-Controlled Design Studies, Measurement Systems.	12	20%
4	Series Compensators: Series Compensation, Fixed Series Compensation, Static Synchronous Series Compensators and TCSC, The TCSC Controller, Operation of the SSSC & TCSC, Analysis of the TCSC & SSSC, Capability Characteristics, Harmonic Performance, Losses. Modeling of the TCSC & SSSC, Unified Power Flow Controller (UPFC), Analysis of UPFC.	20	30%
5	Emerging FACTS Controllers The STATCOM, D-Statcom, Distributed Voltage Regulators, The SSSC, Comparative Evaluation of Different FACTS Controllers, Future Direction of FACTS Technology.	10	20%
Total		60	100

C. Instructional Methods

- 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 and laboratory, which may carries five marks in overall evaluation.
- Two internal exams may be conducted and average of the same may be converted to equivalent of 15 marks as a part of internal theory evaluation.



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- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance 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.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

D. Student Learning outcomes:

- Students should be able to understand role of reactive power control and basics of FACTS.

E. Text Books & Reference Books:

- Understanding FACTS, N.G.Hingorani and L.Gyugyi, Standard Publishers, Delhi, 2001
- FACTS Controllers in Power Transmission & Distribution: Padiyar K R, New Age International (P) Limited.
- 3. Reactive Power Control in Electric Systems: T J E Miller, John Willey
- 4. Power System Stability and Control, PrabhaKundur, Tata McGrahill
- 5. Thyristor-based FACTS controllers for Electrical Transmission System :
- R. Mohan Mathur, R K Verma, Wiley IEEE Press