

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

Electrical Engineering

Subject Name : Flexible AC Transmission systems (Power)

Sr.No	Course content
1.	Introduction Background.,Electrical Transmission Networks., Conventional Control , Mechanisms.,Flexible ac Transmission Systems (FACTS),Emerging Transmission Networks.
2.	Reactive-Power Control in Electrical Power Transmission Systems: Reactive Power, Uncompensated Transmission Lines,Passive Compensation
3.	Principles of Conventional Reactive-Power Compensators Synchronous Condensers , The Saturated Reactor (SR) , The Thyristor-Controlled Reactor (TCR) , The Thyristor-Controlled Transformer (TCT) , The Fixed Capacitor-Thyristor-Controlled Reactor (FC-TCR) , The Mechanically Switched Capacitor-Thyristor-Controlled Reactor (MSC-TCR) , The Thyristor-Switched capacitor and Reactor, The Thyristor-Switched capacitor-Thyristor-Controlled Reactor (TSC-TCR), A Comparison of Different SVCs, Summary
4.	SVC Control Components and Models Measurement Systems , The Voltage Regulator, Gate-Pulse Generation, The Synchronizing System, Additional Control and Protection Functions, Modeling of SVC for Power-System Studies
5.	Concepts of 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, 3rd Harmonic Distortion, Voltage-Controlled Design Studies
6.	Applications Increase in Steady-State Power-Transfer Capacity, Enhancement of Transient Stability, Augmentation of Power-System Damping, SVC Mitigation of Subsynchronous Resonance (SSR), Prevention of Voltage Instability
7.	The Thyristor-Controlled Series Capacitor (TCSC)

	Series Compensation, The TCSC Controller, Operation of the TCSC, The TSSC, Analysis of the TCSC, Capability Characteristics, Harmonic Performance, Losses. Response of the TCSC, Modeling of the TCSC
8.	TCSC Applications Open-Loop Control, Closed-Loop Control, Improvement of the System-Stability Limit, Enhancement of System Damping,, Sub synchronous Resonance (SSR) Mitigation, Voltage-Collapse Prevention, TCSC Installations
9.	Emerging FACTS Controllers The STATCOM, THE SSSC, The UPFC, Comparative Evaluation of Different FACTS Controllers, Future Direction of FACTS Technology

Reference Books:

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