GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

Electrical Engineering

Subject Name : Application of Power Electronics in Power Systems (Power Electronics Group)

Sr. No.	Course Content
1	Introduction: Background, Electrical Transmission Networks, Flow of power in AC system and conventional control mechanisms, Definition of Flexible ac Transmission Systems (FACTS) and brief description, Possible benefits from 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-Thristor-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	Static shunt compensators: Objective of shunt compensation, Methods of controllable var generation, SVC, and STATCOM, Comparison between SVC and STATCOM.
5	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
6	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
7	Combined compensators: Introduction, operating principle and control structure of UPFC, IPFC, Generalized and multi functional FACTS controllers
8	Special Purpose Facts Controllers: Sub synchronous Resource; NGH-SSR Damping Scheme, Thyristor-Controlled Breaking Resistor (TCBR)

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 McGrawhill