GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. SEMESTER : VIII
ELECTRICAL ENGINEERING

Subject Name: **ADVANCED POWER ELECTRONICS II**

Sr. No.	Course Contents	Total Hrs
1.	**INTRODUCTION OF FACTS DEVIECES:** 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.	**06**
2.	**REACTIVE - POWER CONTROL IN ELECTRICAL POWER TRANSMISSION SYSTEMS:** Reactive Power, Uncompensated Transmission Lines, Compensation : Shunt Compensation, Series Compensation, Effect of compensation on power-Transfer Capacity	**08**
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 (TSCTCR), A Comparison of Different SVCs, Summary	**12**
4.	**HVDC TRANSMISSION-DEVELOPMENT:** Introduction, Historical Development, Equipment required for HVDC System, Comparison of AC and DC transmission, Limitation of HVDC Transmission Lines, Applications	**04**
5.	**HVDC CONVERTORS:** Introduction, Insulated Gate Bipolar Transistor (IGBT), HVDC Convertor Valve and Valve Assembly, HVDC –VSC Operation and Principles, Three Phase Six Pulse Converter using SCRs, Twelve Pulse Bridge Converters.	**06**
6.	**SIX PULSE CONVERTER OPERATION AND ANALYSIS:** Introduction, Conduction Sequence in Six Pulse Converter, Ideal Commutation Process without Gate control, DC output Voltage, Gate control of valve, Analysis of Voltage Waveform with overlap angle, Voltage dropped in PU Quantities, Complete Characteristics Of converter as Rectifier /Inverter, Analysis of Twelve Pulse Converter, Power flow in HVDC Link, Operation and Analysis Of VSC converters	**06**
7.	**CONTROL OF HVDC CONVERTER AND SYSTEM:** Introduction, Mechanism of AC power Transmission, Principles of Control, Necessity of Control in case of DC link, Rectifier Control, Compounding Of Rectifier, Power Reversal in DC link, Voltage Dependent Current Order Limit- Characteristics of Converter, System Control Hierarchy and Basic Philosophy, Inverter Extinction Angle Control (EAG)	**06**

Reference Books:

1. Thyristor-based FACTS controller for Electrical Transmission Systems: R. Mohan Mathur, R K Verma, John Wiley & Sons, Inc., 2002
2. Understanding FACTS: Concepts and Technology of Flexible AC transmission Systems, Delhi Publishers, ISBN-13: 9788186308790, 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. HVDC Transmission: S Kamakshaiah, V Kamaraju , McGrawHill, ISBN: 9780071072533
5. Reactive Power Control in Electric Systems: T J E Miller, John Willey
6. Power System Stability and Control, Prabha Kundur, Tata McGraw-Hill