

APPLICATIONS OF POWER ELECTRONICS IN POWER SYSTEM

PEM 301 (B)

L-T-P=3-0-2

Course Outcomes (CO):

Upon successful completion of this course, students should be able to:

CO1: Establish the understanding of the basics of FACTS.

CO2: Understand the conceptual details of Modeling and Analysis of FACTS controllers.

CO3: Demonstrate the working of the SVC, TCSC, STATCON, SSSC, UPFC.

CO4: Analysis the Harmonics creating loads, modeling, harmonic propagation, Series and parallel resonances, harmonic power flow, Mitigation of harmonics, filters.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓		✓	✓					✓	
CO2	✓		✓		✓	✓			✓			
CO3	✓		✓					✓	✓	✓	✓	
CO4	✓		✓			✓	✓					✓

Course Contents:

Unit 1: Steady state and dynamic problems in AC systems: (8 Hours)

Flexible AC transmission systems (FACTS), Principles of series and shunt compensation, Description of static VAR compensators (SVC), Thyristor Controlled series compensators (TCSC), Static phase shifters (SPS), Static condenser (STATCON), Static synchronous series compensator (SSSC) and Unified power flow controller (UPFC),

Unit 2: Modeling and Analysis of FACTS controllers: (7 Hours)

Control strategies to improve system stability, Power Quality problems in distribution systems

Unit 3: Harmonics: (5 Hours)

Harmonics creating loads, modelling, harmonic propagation, Series and parallel resonances, harmonic power flow, Mitigation of harmonics, filters, passive filters, Active filters, shunt, series hybrid filters, voltage sags & swells, voltage flicker, Mitigation of power quality problems using power electronic conditioners, IEEE standards, HVDC Converters and their characteristics, Control of the converters (CC and CEA), Parallel and series operation of converters.

Text Book:

1. N.G. Hingorani & Laszlo Gyugyi, Understanding FACTS, IEEE Press, 2000.
2. E. F. Fuchs & Mohammad A.S. Masoum, Power Quality in Power Systems and Electrical Machines, Elsevier Academic Press 2008.
3. K.R. Padiyar, FACTS controllers in power transmission and distribution, New Age International publishers, New Delhi, 2007.
1. K.R. Padiyar, HVDC Power Transmission Systems, New Age International publishers, New Delhi, 1999.