

Flexible AC Transmission Systems

Hours Per Week :

L	T	P	C
4	1	-	4

Total Hours :

L	T	P
50	16	0

WA/RA	SA	SSH	S	BS
5	8	40	5	5

Course Description and Objectives:

This course deals with the fundamental concepts of FACTS technology which are emerging in the area of power systems. The objective of this course is to understand the role of FACTS technology in delivering quality power at bulk levels.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

- Understand the importance of FACTS technology.
- Analyze different FACTS devices in Transmission system.
- Bring out the advantages of FACTS technology.
- Design of FACTS controllers for different Power system applications.

SKILLS ACQUIRED:

- ✓ Analyze the performance of given transmission system with and without FACTS technology.
- ✓ Review the static devices for series and shunt control.
- ✓ Select suitable FACTS device for specific power quantity/quality.
- ✓ Identify suitable location of FACTS controller for given transmission system.

ACTIVITIES:

- Survey on FACTS devices existed in India.
- Simulation of Series FACTS Controllers using MATLAB.
- Simulation of Shunt FACTS Controllers using MATLAB.

UNIT – I **L- 10**

Introduction: Power Flow in AC Systems, Loading capability Limits, Dynamic stability considerations, controllable parameters, basic types of FACTS controllers.

UNIT – II **L- 10**

Voltage Source Converters: Single phase and 3-phase full wave bridge converters, transformer connections for 12, 24, 48 pulse operation, 3 level voltage source converters, PWM converters.

UNIT – III **L- 10**

Static Shunt Compensation: Objectives of shunt compensation, Voltage in stability and its prevention, power oscillations and damping, controllable VAR generation, variable impedance type VAR generators.

UNIT – IV **L- 10**

SVC and STATCOM: Dynamic performance, transient stability enhancement with SVC and STATCOM- operating principle – V-I characteristics.

UNIT – V **L- 10**

Series Compensation & UPFC: Series capacitive compensation, transient stability improvement, Thyristor controlled series capacitor (TCSC), thyristor control power angle regulator (TCPAR), Unified power flow controller.

TEXT BOOKS:

1. N.G. Hingorani and L.Guygi, “Understanding FACTS Devices”, IEEE Press Publications, Standard Publishers, Delhi 2001.
2. Mohan Mathur, R., Rajiv. K. Varma, “Thyristor – Based Facts Controllers for Electrical Transmission Systems”, IEEE press and John Wiley & Sons, Inc.

REFERENCES:

1. E. Achaet. Al. John Wiley, “FACTS: Modelling and Simulation in power Networks”, London, UK, 2004
2. P. Kundur, “Power System Stability and Control”, McGrawHill, 1994.