

**4/4 B.Tech. SEVENTH SEMESTER****EE7T4****FLEXIBLE AC TRANSMISSION SYSTEMS****Credits: 3****Lecture: 3 periods/week****Internal assessment: 30 marks****Tutorial: 1 period /week****Semester end examination: 70 marks****Course Objective:**

The main objective is to impart the knowledge of FACTS controllers, series, shunt compensation and also the concept of voltage source and current source converters

**Course Outcomes:**

After completing this course, student will be able to

1. Understand the concepts of various FACTS controllers
2. Analyze and design reactive power compensation systems
3. Solve real and reactive power flow problems
4. Evaluate the impact of flexible AC transmission systems on modern power systems.

**Unit I**

Transmission interconnections, power flow in an AC System, loading capability limits, power flow and dynamic stability considerations, importance of controllable parameters. Basic types of FACTS controllers, benefits from FACTS controllers.

**Unit II**

Basic concept of voltage source converter, single phase full wave bridge converter, single phase-leg (pole) operation, square-wave voltage harmonics for a single phase bridge and three phase full wave bridge converters, basic concept of current source converters, comparison of current source converters with voltage source converters.

**Unit III**

Objectives of shunt compensation, midpoint voltage regulation for line segmentation, end of line voltage support to prevent voltage instability, methods of controllable var generation, variable impedance type static var generators – TCR and TSR, TSC, FC-TCR, TSC-TCR, switching converter type var generators, hybrid var generators.

**Unit IV**

SVC and STATCOM: The regulation slope - transfer function and dynamic performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

**Unit V**

Static series compensators: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC. Introduction to UPFC and IPFC and their role in power system operation.

**Learning Resources****Text Books:**

1. Understanding FACTS, N.G.Hingorani and L.Guygi, Delhi IEEE Press 2001
2. Flexible AC transmission system (FACTS) by YONG HUE SONG and ALLAN T JOHNS, Institution of Electrical Engineers, London