

**M.TECH FIRST SEMESTER
FLEXIBLE AC TRANSMISSION SYSTEMS**

17EEPC1T6A

Lecture: 4 periods/week

Credits: 4

Internal Assessment: 40 marks

End Semester Assessment: 60 marks

Course Objective:

The main objective is to impart the knowledge on FACTS controllers, the concept of voltage source and current source converters. To educate on static shunt compensators and static series compensators.

Course Learning Outcomes: At the end of the course the student will be able to

1. Understand the concepts of various basic FACTS controllers.
2. Analyze the operation of voltage source and current source converters.
3. Analyze the operation of various static shunt compensators.
4. Analyze the operation of static series and combined compensators.

UNIT-I: INTRODUCTION TO FACTS

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: VOLTAGE SOURCED AND CURRENT SOURCED CONVERTERS

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, three phase full wave bridge converters, three level voltage sourced converter, basic concept of current source converters, comparison of current source converters with voltage source converters.

UNIT-III: STATIC SHUNT COMPENSATORS

Objectives of shunt compensation, midpoint voltage regulation for line segmentation, end of line voltage support to prevent voltage instability, methods of controllable var generation. 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-IV: STATIC SERIES AND COMBINED 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.

TEXT BOOK:

Understanding FACTS –Concepts and Technology of Flexible AC Transmission Systems by Narain G.Honorani and Laszlo Gyugyi, Delhi IEEE Press 2001.

REFERENCE BOOK:

Flexible AC transmission system (FACTS) by Yong Hue Song and Allan T. Johns, Institution of Electrical Engineers, London.