I Year I Semester	L	P	C
Code: 17PE104	4	0	3

FLEXIBLE AC TRANSMISSION SYSTEMS
(Common to PE, P&ID, PE&ED, PE&D, PE&S, EM&D)

Prerequisites: Concepts on Power Electronics and Power Systems

Course Educational Objectives:

1. To study the performance improvements of transmission system with FACTS.
2. To study the effect of static shunt compensation.
3. To study the effect of static series compensation.
4. To study the effect of UPFC.

UNIT 1 : FACTS concepts, Transmission interconnections, power flow in an AC System, loading capability limits, Dynamic stability considerations, importance of controllable parameters, basic types of FACTS controllers, benefits from FACTS controllers.

UNIT 2: Basic concept of voltage and current source converters, comparison of current source converters with voltage source converters. Static shunt compensation : Objectives of shunt compensation, midpoint voltage regulation, voltage instability prevention, improvement of transient stability, Power oscillation damping, methods of controllable var generation, variable impedance type static var generators, switching converter type var generators, hybrid var generators.

UNIT 3: SVC and STATCOM: The regulation and slope transfer function and dynamic Performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control.

UNIT 4: Static series compensators: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristorcontrolled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristorcontrolled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.

UNIT 5: Unified Power Flow Controller: Basic operating principle, conventional transmission control capabilities, independent real and reactive power flow control, comparison of the UPFC to series compensators and phase angle regulators.

Course Outcomes:

- After completion of the course, the student will be able to:
- Know the performance improvement of transmission system with FACTS.
- Get the knowledge of effect of static shunt and series compensation.
- Know the effect of UPFC.
- Determine an appropriate FACTS device for different types of applications.

Reference Books:

1. “Understanding FACTS Devices” N.G.Hingorani and L.Guygi, IEEE Press.
Indian Edition is available:--Standard Publications
2. Sang.Y.HandJohn.A.T, “Flexible AC Transmission systems” IEEE Press (2006).
3. HVDC & FACTS Controllers: applications of static converters in power systems-
Vijay K.Sood- Springer publishers