

**III B.Tech – II Semester**  
**(20EE6321) FLEXIBLE AC TRANSMISSION SYSTEMS**

Int. Marks	Ext. Marks	Total Marks
30	70	100

L	T	P	C
3	-	-	3

**Pre-Requisites:** Power Systems – II, Power Electronics

**Course 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–I: FACTS concepts**

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–II: Basic Concept of Voltage and Current Source Converters**

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.

**UNIT–III: 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–IV: 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 TSSC and TCSC.

**UNIT–V: 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 successful completion of the course, the students will be able to:

S.No	Course Outcome	BTL
1.	Know the performance improvement of transmission system with FACTS.	L1
2.	Get the knowledge of effect of static shunt and series compensation.	L1
3.	Know the effect of UPFC.	L1
4.	Determine an appropriate FACTS device for different types of applications.	L3

**Correlation of COs with POs& PSOs:**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2			2							3	3
CO2	3	3	3	2		2							3	3
CO3	2	2	2	1		2							3	3
CO4	3	3	3	2		3							3	3

**Text Books:**

1. “Understanding FACTS Devices” N.G.Hingorani and L.Guygi, IEEE Press. Indian Edition is available:-- Standard Publications
2. Sang.Y.Hand John.A.T, “Flexible AC Transmission systems” IEEE Press (2006).

**Reference Books:**

1. HVDC & FACTS Controllers: applications of static converters in power systems-Vijay K.Sood- Springer publishers