

## **EE8011 FLEXIBLE AC TRANSMISSION SYSTEMS**

### DETAILED SYLLABUS

#### **OBJECTIVES:**

To impart knowledge about the following topics:

- The start-of-art of the power system
- Performance of power systems with FACTS controllers.
- FACTS controllers for load flow and dynamic analysis

#### **UNIT I INTRODUCTION**

Real and reactive power control in electrical power transmission lines–loads & system compensation–Uncompensated transmission line–shunt and series compensation.

#### **UNIT II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS**

Voltage control by SVC–Advantages of slope in dynamic characteristics–Influence of SVC on system voltage–Design of SVC voltage regulator–TCR-FC-TCR-Modeling of SVC for power flow and fast transient stability– Applications: Enhancement of transient stability – Steady state power transfer –Enhancement of power system damping.

#### **UNIT III THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS**

Operation of the TCSC–Different modes of operation–Modelling of TCSC, Variability reactance model– Modelling for Power Flow and stability studies. Applications: Improvement of the system stability limit–Enhancement of system damping.

#### **UNIT IV VOLTAGE SOURCE CONVERTER BASED FACTS CONTROLLERS**

Static Synchronous Compensator (STATCOM)–Principle of operation–V-I Characteristics. Applications: Steady state power transfer-enhancement of transient stability-prevention of voltage instability. SSSC-operation of SSSC and the control of power flow–modelling of SSSC in load flow and transient stability studies- Dynamic voltage restorer (DVR).

#### **UNIT V ADVANCED FACTS CONTROLLERS**

Interline DVR(IDVR) - Unified Power flow controller (UPFC) - Interline power flow controller (IPFC) - Unified Power quality conditioner (UPQC).

#### **TEXT BOOKS:**

1. R. Mohan Mathur, Rajiv K. Varma, “Thyristor–Based Facts Controllers for Electrical Transmission Systems”, IEEE press and John Wiley & Sons, Inc, 2002.
2. NarainG. Hingorani, “Understanding FACTS-Concepts and Technology of Flexible AC Transmission Systems”, Standard Publishers Distributors, Delhi-110006,2011.
3. T.J.E Miller, Power Electronics in power systems, John Wiley and sons.

**REFERENCES**

1. K.R. Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International (P) Limited, Publishers, New Delhi, 2008
2. A.T. John, "Flexible A.C. Transmission Systems", Institution of Electrical and Electronic Engineers (IEEE), 1999.
3. V.K. Sood, HVDC and FACTS controllers—Applications of Static Converters in Power System, APRIL2004, Kluwer Academic Publishers,2004.