

Course Syllabi: UEE604: Flexible AC Transmission Systems (L : T : P :: 3 : 1 : 0)

1. **Course number and name:** UEE604: Flexible AC Transmission Systems

2. **Credits and contact hours:** 3.5 and 4

3. **Text book, title, author, and year**

Text Books / Reference Books

- *Hingorani, N.G. and Gyragyi, L., Understanding FACTS : Concepts and Technology of Flexible AC Transmission System, Standard Publishers and Distributors (2005).*
- *Sang, Y.H. and John, A.T., Flexible AC Transmission Systems, IEEE Press (2006).*
- *Ghosh, A. and Ledwich, G., Power Quality Enhancement Using Custom Power Devices, Kluwer Academic Publishers (2005).*
- *Mathur, R.M. and Verma, R.K., Thyristor Based FACTS Controllers for Electrical Transmission Systems, IEEE Press (2002).*

a. Other supplemental materials

- Nil

4. **Specific course information**

a. Brief description of the content of the course (catalog description)

Power Transmission control: Fundamentals of AC power transmission, Transmission problems and needs, Overview of stability, the emergence of FACTS, FACTS controller and consideration.

Static power convertor: Review of Power Electronics fundamentals: Static power convertor structures, AC controller based structure, DC link convertor topologies, Convertor output and harmonic control.

Shunt Compensation: Shunt SVC principles, Configuration and control, STATCOM, Configuration applications.

Series Compensation: Fundamental of series compensation, Principle of operation, Application of TCSC for different problems of power system, TCSC lay out, SSSC principle of operation.

Phase Shifter: Principle of operation, Steady state model of static phase shifter, Operating characteristics of SPS, Power current configuration of SPS application.

Unified Power Flow Controllers: Basic operating principles and characteristics, Control UPFC installation applications, UPFC model for power flow studies.

5. **Specific goals for the course**

After the completion of the course, the students will be able to:

- Describe the converter configuration for different power systems applications such as HVDC, FACTS etc.
- Evaluate the converters, harmonics on AC and DC side and filtering.
- Classify various compensators suited for various power system purposes.
- Analyze power system behaviour with different shunt compensators.
- Appraise series compensated power system behaviour with different series compensators.
- Analyse system behaviour with hybrid shunt-series compensators.

6. Brief list of topics to be covered

- Power Transmission control
- Static power convertor
- Shunt Compensation
- Series Compensation
- Phase Shifter& Unified power flow controller