

Flexible AC Transmission Systems [FACTS]

B.E. Sem. VIII [ELEC]

(Elective – II)

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical & Oral	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

1. FACTS Concepts and General System Considerations:

Transmission Interconnections- Flow of Power in AC system- What Limits the Loading Capability- Power Flow and Dynamic Stability Considerations of a Transmission Interconnection- Relative Importance of Controllable Parameters- Basic Types of FACTS Controllers-Brief Description and Definitions- Benefits from FACTS Technology

2. Load Compensation:

Reactive Power (VAR) Compensation for isolated loads - Power factor correction-Voltage Regulation-V-Q characteristics for an inductive load-System load line-Effect of characteristics of VAR compensators in terms of short circuit levels-Load balancing in 3-phase loads with parallel compensation

3. Transmission Line:

Wave equation-Standing Waves-surge impedance and SIL-Voltage and current profile along unloaded line-Ferranti effect-Effect of loading on reactive power requirement-Compensated transmission line-Uniformly distributed fixed compensation-Effect of distributed compensation on line charging reactive power

4. Voltage Control:

Tap changing transformers-Booster transformers -Static voltage regulators-Thyristorised series voltage injection

5. Types of compensators:

Passive and active compensators-Shunt reactor/ capacitor compensators-Single-Multiple-Mid-point-Static compensators-Control schemes and characteristics of FC-TCR-TCR-TSC-TSC and other combinations

6. Dynamic compensation:

Introduction-Effect on stability of a power system

7. Unified Power Flow Controller (UPFC):

Basic relationships for power flow control-Synchronous Voltage sources-Implementation of synchronous voltage source-Shunt compensation by synchronous voltage source-Reactive power compensation scheme-Series compensation by synchronous voltage source-Reactive series compensation-Unified power flow concept

Reference Books :

1. Reactive power control in Electric Systems (*Miller T.J.E.*) Wiley Europe, 1st Ed.1983.
2. Understanding FACTS : Concepts and Technology of Flexible AC Transmission Systems (*Hingorani N.G. & Gyugi L.*) Wiley-IEEE Press, 1st 1999

