L T P C

EE809 FLEXIBLE AC TRANSMISSION SYSTEMS 3 0 0 3

1. INTRODUCTION 9

The concept of flexible AC transmission - reactive power control in electrical power transmission lines -uncompensated transmission line – series and shunt compensation. Overview of FACTS devices - Static Var Compensator (SVC) – Thyristor Switched Series capacitor (TCSC) – Unified Power Flow controller (UPFC) - Integrated Power Flow Controller (IPFC).

2. STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS 9

Voltage control by SVC – advantages of slope in dynamic characteristics – influence of SVC on system voltage. Applications - enhancement of transient stability – steady state power transfer – enhancement of power system damping – prevention of voltage instability.

3. THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS 9

Operation of the TCSC - different modes of operation – modeling of TCSC – variable reactance model – modeling for stability studies. Applications - improvement of the system stability limit – enhancement of system damping – voltage collapse prevention.

4. EMERGING FACTS CONTROLLERS 9

Static Synchronous Compensator (STATCOM) – operating principle – V-I characteristics – Unified Power Flow Controller (UPFC) – Principle of operation - modes of operation – applications – modeling of UPFC for power flow studies.

5. CO-ORDINATION OF FACTS CONTROLLERS 9

FACTs Controller interactions – SVC–SVC interaction - co-ordination of multiple controllers using linear control techniques – Quantitative treatment of control coordination.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Mohan Mathur, R., Rajiv. K. Varma, "Thyristor – Based Facts Controllers for Electrical Transmission Systems", IEEE press and John Wiley & Sons, Inc.

REFERENCES:

1. A.T.John, "Flexible AC Transmission System", Institution of Electrical and Electronic Engineers (IEEE), 1999.

2. Narain G.Hingorani, Laszio. Gyugyl, "Understanding FACTS Concepts and Technology of Flexible AC Transmission System", Standard Publishers, Delhi 2001.

SUBJECT DESCRIPTION AND OBJECTIVES

AIM:

To enhance the transmission capability of transmission system by shunt and series compensation using static controllers.

OBJECTIVES:

i. To understand the concept of flexible AC transmission and the associated problems.
ii. To review the static devices for series and shunt control.
iii. To study the operation of controllers for enhancing the transmission capability.

DESCRIPTION

A **Flexible Alternating Current Transmission System** (FACTS) is a system composed of static equipment used for the AC transmission of electrical energy. It is meant to enhance controllability and increase power transfer capability of the network. It is generally a power electronics-based system.

FACTS is defined by the IEEE as "a power electronic based system and other static equipment that provide control of one or more AC transmission system parameters to enhance controllability and increase power transfer capability.

MICRO LESSON PLAN

HOURS	LECTURER TOPICS	READING
	UNIT – I INTRODUCTION	
1	The concept of flexible AC transmission	TB1
2	Reactive power control in electrical power	TB1
3	transmission lines - uncompensated transmission line	TB1
4	series and shunt compensation	TB1
5	Overview of FACTS devices	TB1
6	Static Var Compensator (SVC)	RB2
7	Thyristor Switched Series capacitor (TCSC)	RB2
8	Unified Power Flow controller (UPFC)	RB2
9	Integrated Power Flow Controller (IPFC).	RB2
	UNIT – II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS	
10	Voltage control by SVC	TB1
11	advantages of slope in dynamic characteristics	TB1
12	influence of SVC on system voltage.	TB1
13	Applications	TB1
14	enhancement of transient stability	TB1
15	enhancement of transient stability	TB1
16	steady state power transfer	TB1
17	enhancement of power system damping	TB1
18	prevention of voltage instability	TB1
	UNIT – III THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS	
19	Operation of the TCSC	TB1
20	different modes of operation	TB1
21	Modeling of TCSC	TB1
22	variable reactance model	TB1
23	Modeling for stability studies	TB1
24	Applications	TB1
25	improvement of the system stability limit	TB1
26	enhancement of system damping	TB1
27	voltage collapse prevention	TB1
	UNIT IV EMERGING FACTS CONTROLLERS	

28	Static Synchronous Compensator (STATCOM)	TB1
29	Operating principle	TB1
30	V-I characteristics	TB1
31	Unified Power Flow Controller (UPFC)	TB1 , RB2
32	Principle of operation	TB1 , RB2
33	modes of operation	TB1 , RB2
34	Applications	TB1
35	Modeling of UPFC for power flow studies	RB 2
36	Modeling of UPFC for power flow studies	RB 2
UNIT V CO-ORDINATION OF FACTS CONTROLLERS		
37	FACTs Controller interactions	TB1
38	FACTs Controller interactions	TB1
39	SVC - SVC interaction	TB1
40	SVC - SVC interaction	TB1
41	SVC - SVC interaction	TB1
42	co-ordination of multiple controllers using linear control techniques	TB1
43	co-ordination of multiple controllers using linear control techniques	TB1
44	Quantitative treatment of control Coordination	Notes
45	Quantitative treatment of control Coordination	Notes

Prepared By

A.PRABHU M.E.,

AP/EEE