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PS5202 HVDC AND FACTS

DETAILED SYLLABUS

OBJECTIVES:

- To emphasize the need for FACTS controllers.
- To learn the characteristics, applications and modeling of series and shunt FACTS controllers.
- To analyze the interaction of different FACTS controller and perform control coordination
- To impart knowledge on operation, modelling and control of HVDC link. □ To perform steady state analysis of AC/DC system.

UNIT I INTRODUCTION

Review of basics of power transmission networks-control of power flow in AC transmission line- Analysis of uncompensated AC Transmission line- Passive reactive power compensation: Effect of series and shunt compensation at the mid-point of the line on power transfer- Need for FACTS controllers- types of FACTS controllers. Comparison of AC & DC Transmission, Applications of DC Transmission Topologies.

UNIT II SVC & STATCOM

Configuration of SVC- voltage regulation by SVC- Modelling of SVC for load flow analysis- Design of SVC to regulate the mid-point voltage of a SMIB system- Applications Static synchronous compensator (STATCOM) - Operation of STATCOM – Voltage regulation-Power flow control with STATCOM.

UNIT III TCSC and SSSC

Concepts of Controlled Series Compensation- Operation of TCSC - Analysis of TCSC operation - Modelling of TCSC for load flow studies - Static synchronous series Compensator (SSSC) - Operation of SSSC - Modelling of SSSC for power flow – operation of Unified power flow controllers (UPFC). UNIT IV ANALYSIS OF HVDC LINK 9 Simplified analysis of six pulse Graetz bridge – Characteristics - Analysis of converter operations – Commutation overlap – Equivalence circuit of bipolar DC transmission link – Modes of operation – Mode ambiguity – Different firing angle controllers – Power flow control.

UNIT V POWER FLOW ANALYSIS IN AC/DC SYSTEMS

Per unit system for DC Quantities - Modelling of DC links - Solution of DC load flow – Solution of AC-DC power flow – Unified and Sequential methods.

REFERENCES

1. Mohan Mathur, R., Rajiv. K. Varma, “Thyristor – Based Facts Controllers for Electrical Transmission Systems”, IEEE press and John Wiley & Sons, Inc.
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3. K.R.Padiyar, "HVDC Power Transmission Systems", New Age International (P) Ltd., New Delhi, 2002.
4. J.Arrillaga, "High Voltage Direct Current Transmission", Peter Pregrinus, London, 1983.
5. V.K.Sood, "HVDC and FACTS controllers- Applications of Static Converters in Power System", Kluwer Academic Publishers 2004.