Reg. No. : | | | | | | | | | | |

Question Paper Code: 92053

M.E. DEGREE EXAMINATION, MAY 2014.

Elective

Power Electronics and Drives

01PPE507 - POWER CONTROLLERS IN POWER SYSTEMS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What is meant by load compensation?
2. State any two applications of synchronous condenser.
3. Draw the single line diagram of a TCR compensator with fixed - shunt capacitors.
4. List the advantages of Slope in the dynamic characteristic of SVC.
5. What do you understand by Bang - Bang Control?
6. What are the criteria for Sub Synchronous Resonance (SSR) Mitigation by the TCSC?
7. List any two applications of STATCOM.
8. What do you mean by Available Transfer Capability (ATC)?
9. State the frequency ranges for various controller interactions.
10. What is meant by Electromechanical-Oscillation Interactions?

PART - B (5 x 14 = 70 Marks)

11. (a) Explain in detail the effect of shunt and series compensation on power-transmission capacity. (14)

Or

(b) Explain the operating characteristics of Saturated Reactor compensator. (14)

12. (a) Explain the configuration and operating characteristics of a Thyristor-Switched Capacitor (TSC). (14)

Or

(b) (i) Explain the application of a Static Var Compensator (SVC) for damping Sub synchronous oscillations in Power Systems. (7)

(ii) Explain how transient stability is improved with use of Static Var Compensator (SVC). (7)

13. (a) Discuss the different modes of operation of Thyristor-Controlled Series Capacitor (TCSC). (14)

Or

(b) Explain the closed loop control of TCSC with Constant-Current (CC) control model and Constant-Angle (CA) Control model. (14)

14. (a) Explain the principle of operation and V-I characteristics of Static Synchronous Compensator (STATCOM). (14)

Or

(b) (i) Explain the operation of Static Synchronous Series Compensator (SSSC). (7)

(ii) Explain how Static Synchronous Series Compensator (SSSC) controls the power flow in a transmission line. (7)

15. (a) Explain in detail about the control interaction between multiple SVCs in a large power system. (14)

Or

(b) Describe the co-ordination procedure of multiple controllers using linear control technique. (14)

PART - C (1 x 10 = 10 Marks)

16. (a) Explain the mathematical modeling of Unified Power Flow Controller (UPFC) for Power Flow studies. (10)

Or

(b) Explain in detail about the design of an Static Var Compensator (SVC) as voltage regulator. (10)