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Question Paper Code : 11175

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Elective

Power Electronics and Drives

PX 5003 — FLEXIBLE AC TRANSMISSION SYSTEMS

(Regulation 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term FACTS.
2. What are the objectives of line compensation?
3. Define the term static VAR compensator (SVC).
4. What is the best location for SVC?
5. List the disadvantage of fixed series compensation.
6. How is the variation of capacitive reactance achieved in TCSC?
7. List the application of STATCOM.
8. What are the different constraints for operating UPFC?
9. How is coordination of FACTS controllers carried out?
10. Write the assumptions of control coordination for damping enhancement.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the uncompensated AC line and derive the equation for voltage and current variation in long AC transmission line.

Or

(b) Compare the rating of shunt compensator and series compensator for enhancement of power transfer to ΔP.

12. (a) Explain the transient stability enhancement of SMIB system with SVC installed at midpoint of transmission line.

Or

(b) Draw the equivalent circuit and explain the steady state control characteristics of SVC.

13. (a) Draw and explain the different modes of operation of TCSC.

Or

(b) Briefly explain the operation and characteristics of GCSC with neat sketch.

14. (a) Draw the schematic diagram of SSSC and explain its role in transmission line.

Or

(b) With a neat sketch, explain the implementation of UPFC.

15. (a) Explain the controller interactions between multiple SVCS (SVC-SVC) in a large power system.

Or

(b) Using linear control techniques, explain the co-ordination of multiple controllers.

PART C — (1 × 15 = 15 marks)

16. (a) Consider a synchronous generator connected to infinite bus. Voltage at infinite bus is $1\angle O^\circ$. The synchronous generator delivers 0.9 + j 0.3 pu MW and MVAR. A SVC is connected at midpoint to regulate the midpoint voltage to 1.02 pu. Find the current that must be injected to regulate midpoint voltage to 1.02 pu. Transmission line reactance is 0.65 pu.

Or

(b) Consider an SMIB system in which SSSC is installed at the middle of line. The terminal voltage of the machine is $1\angle 25^\circ$ and infinite bus voltage is $1\angle 0^\circ$. The reactance of the transmission line is 0.75 pu. Find the gain of the damping controller to enhance the damping ratio Σ=0.15 pu.

Assume damping due to other sources are zero.