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Question Paper Code : 71495

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Eighth Semester

Electrical and Electronics Engineering

EE 2036/EE 809/10133 EEE 45 – FLEXIBLE AC TRANSMISSION SYSTEMS

(Regulation 2008/2010)

(Common to PTEE 2036 – Flexible AC Transmission Systems for B.E. (Part-Time)
Seventh Semester – EEE – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the two main reasons for incorporating FACTS devices in electric power systems?
2. State the features of Interline Power Flow Controller (IPFC).
3. What are the three basic modes of SVC control?
4. How is voltage instability identified in a power system?
5. State any two advantages of TCSC.
6. What are the functions of damping control of a TCSC?
7. List any two power system performances that can be improved by STATCOM.
8. Write the applications of UPFC.
9. What is the main problem with multiple SVCs in a power system network?
10. What is the significance of 'modal-performance index'?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain briefly about load compensation. (4)
(ii) What are the objectives of line compensation? Explain the effect of shunt and series compensation on power transmission capacity of a short symmetrical transmission line. (12)

Or

- (b) Describe the working principle of the two types of Static Var Compensator (SVC) with neat schematic diagrams. (8+8)

12. (a) (i) State and explain the advantages of slope in the dynamic characteristics of SVC. (8)
- (ii) Explain the influence of SVC on regulating the AC system voltage for the following two cases: (4+4)
- (1) Coupling transformer ignored
- (2) Coupling transformer considered.

Or

- (b) Explain in detail about the role of SVC in enhancing the steady state power limit and power system damping. (6+10)
13. (a) Draw the basic and practical TCSC modules. Explain the basic principle and different modes of operation of TCSC. (2+4+10)

Or

- (b) Draw and explain the block diagram of the variable reactance model of TCSC and hence derive transient stability and long term stability models. (8+8)
14. (a) With neat sketches, explain the operating principle and the V-I characteristic of Static Synchronous Compensator (STATCOM). (8+8)

Or

- (b) (i) Draw the phasor diagrams illustrating the concepts of various power-flow control functions by use of UPFC. (4)
- (ii) Explain the modeling procedure of UPFC for power-flow studies. (12)
15. (a) What is the need for coordination of different FACTS controllers? Explain the different control interactions that are occurring in multiple FACTS controllers. (2+14)

Or

- (b) Describe the following linear control techniques used for coordination of multiple FACTS controllers: (4+6+6)
- (i) Linear Quadratic Regulator (LQR) based technique
- (ii) Global coordination using non-linear-constrained optimization
- (iii) Control coordination using Genetic Algorithms.

