

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]

Dec.-23-0448

EE-506 (Flexible AC Transmission System)

B.Tech. 5th (CBCS)

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question each from Section A, B, C and D. All parts of Section E are compulsory.

SECTION - A

1. (a) Explain in detail about the classification of different FACTS controllers. (5)
(b) Draw the single line diagrams of SSSC and UPFC. (5)
2. (a) Explain in detail about series and shunt compensation in transmission lines. (5)
(b) Describe the variable reactance model of TCSC with block diagram. (5)

SECTION - B

3. (a) Discuss in detail the static and dynamic VI characteristics of SVC. (5)
(b) Discuss the method of improving transient stability with SVC. (5)
4. (a) Explain the role of SVC in increasing the steady state power-transfer capacity with necessary diagrams and expressions. (5)

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- (b) Explain the method of voltage control by SVC. (5)

SECTION - C

5. (a) Analyze the capability of TCSC in damping the oscillations of power system. (5)
(b) Explain the power exchange process between STATCOM and the power system. (5)
6. (a) Explain the basic principle and different modes of operation in TCSC. (5)
(b) Describe dependence of real and reactive power flow control in UPFC. (5)

SECTION - D

7. (a) Discuss in detail different factors for SVC-SVC interaction. (5)
(b) Discuss the control coordination of multiple controllers with the help of suitable diagram. (5)
8. (a) How IPFC is different from Unified Power Flow Controller? Also discuss its applications. (5)
(b) Explain the use of frequency response curve in the controller interaction analysis. (5)

SECTION - E (Compulsory)

9. Attempts all questions.
(a) What are the objectives of FACTS controllers?
(b) What is meant by passive compensation?

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- (c) State the optimization problem of control coordination.
- (d) Define the droop in VI characteristics of SVC.
- (e) Write the transfer function of SVC voltage regulator in gain time constant form.
- (f) State the need for variable series compensation.
- (g) What is blocked Thyristor mode in TCSC operation?
- (h) State the capabilities of STATCOM.
- (i) Specify the frequency ranges for electromechanical oscillation.
- (j) Draw the UPFC model for power flow studies.

(10×2=20)

SECTION - A

- (p) Write the transfer function of SVC voltage regulator in gain time constant form.
- (q) State the need for variable series compensation.

SECTION - E (Continuation)

- (r) Explain the need for TCSC in power system.
- (s) Write the transfer function of SVC voltage regulator in gain time constant form.
- (t) How does the droop in VI characteristics of SVC affect the power system?
- (u) What is blocked Thyristor mode in TCSC operation?
- (v) Discuss the capabilities of STATCOM.
- (w) Discuss the frequency ranges for electromechanical oscillation.
- (x) Discuss the need for UPFC in power system.

SECTION - D

- (y) Compare the characteristics of TCSC and STATCOM.
- (z) Describe the need for TCSC in power system.
- (aa) Explain the need for UPFC in power system.
- (ab) Write the transfer function of SVC voltage regulator in gain time constant form.
- (ac) Discuss the capabilities of STATCOM.

SECTION - C

- (ad) Explain the need for UPFC in power system.