

B.E/B.Tech(Fulltime) DEGREE END SEMESTER EXAMINATIONS, DEC 2012
ELECTRICAL ENGG BRANCH
VIII SEMESTER
EE9038-FLEXIBLE AC TRANSMISSION SYSTEMS
(REGULATIONS 2008)

DURATION : 3.00 HRS

Maximum Marks -100

Answer ALL Questions

PART A (10 * 2 =20)

1. Explain the need for FACTS controllers.
2. What is meant by surge impedance loading? Derive characteristic impedance.
3. Consider a 765kV symmetrical lossless transmission line with $l=0.965\text{mH/km}$, $c=12.6\text{nF/km}$, and a line length of 1000km. calculate the voltage at a distance of 550km from the sending end when the power flow through the line is 860MW.
4. Compare the fixed series and fixed shunt compensation.
5. Write the advantages of slope in SVC dynamic characteristics.
6. Explain the need for a reactor in series with a capacitor in the TSC circuit.
7. List the advantages of second generation FACTS devices.
8. Compare TCSC and TSSC.
9. Draw the VI Characteristics of SSSC
10. What is the need for co-ordination of FACTS controllers?

PART B (5*16=80)

11. An SVC is connected to 765 kV system has a reactive power range of 550 MVAR production to 250 MVAR absorption. If the per unit proportional gain of voltage regulator is to be 0.65 determine the short-circuit level of the system. The SVC has a slope of 3%. (16)
- 12.a Explain about IEEE basic models that are available for the SVC to represent in the stability studies? (16)

(OR)

- 12.b Consider a 765kV symmetrical lossless transmission line with $l=0.965\text{mH/km}$, $c=11.6\text{nF/km}$, and a line length of 800km. calculate the MVAR that is required to maintain the midpoint voltage at 1.04 pu when the power flow through the line is in range of 750-850MW. (16)

13.a Consider the SMIB system in which the synchronous machine is generating 0.8 pu MW and 0.25 MVAR. The infinite bus voltage is 1 at angle of 0. The machine transient reactance is 0.32 p.u and the transmission line reactance is 0.65p.u. Calculate the value of net reactance offered by the TCSC and the voltage that has to be injected by the TCSC to enhance the power flow to 1.0 p.u (16)

(OR)

13.b Consider a SMIB system in which the synchronous machine is generating 0.9 p.u. MW and 0.3 p.u. MVAR. The voltage of Infinite bus is $0.995+j0.0$ p.u. The machine transient reactance is 0.3p.u. and the transmission line reactance is 0.650 p.u. (a) Calculate what should be the net susceptance of SVC to maintain V_m at 1 p.u. (b) Calculate synchronizing torque co-efficient and with and without SVC at midpoint of the line. (16)

14.a Consider a transmission line a STATCOM is connected at midpoint of the line. Assume that both end voltages are regulated at 1 p.u, the transmission line reactance is 0.8 p.u. calculate the current that must be injected by STATCOM to maintain the midpoint voltage at 1.01 p.u. When the load at receiving end is varied from 0 to 0.9 p.u. (16)

(OR)

14.b i) Explain the different modes of operations of TCSC? (10)

ii) Draw V-I and X-I characteristics curves for single modules TCSC and Two module TCSC. (4)

15.a Explain the principle and operation of UPFC with the aid of block diagram (16)

(OR)

15.b Explain about the effect of electrical coupling and short circuit level on the controller interaction between multiple SVCs that are located in a power system.