Roll No. | | | | | | | | | | |

B.E/B.Tech(Fulltime) DEGREE END SEMESTER EXAMINATIONS,APRIL/ MAY2014

ELECTRICAL & ELECTRONICS ENGG BRANCH

VII SEMESTER

EE9038-FLEXIBLE AC TRANSMISSION SYSTEMS

(REGULATIONS 2008)

DURATION : 3.00 HRS MaximumMarks -100

Answer ALL Questions

PART A (10 * 2 =20)

1. Derive the expression for real power transfer between two buses in a power system.
2. What is meant by surge impedance loading? Derive characteristics Impedance.
3. Draw the voltage profile of a transmission line with midpoint compensation.
4. Compare the fixed series and fixed shunt compensation.
5 Draw the V-I characteristics of mismatched TSC-TCR type of SVC?
6. Explain the need for a reactor in series with a capacitor in the TSC circuit.
7. State why the limitation is imposed on series compensation for transmission lines?
8. Compare TCSC and TSSC.
9 Draw the VI Characteristics of SSSC
10. Draw the P-δ characteristics of SSSC and compare it with uncompensated case.

PART B (5*16=80)

11. An SVC is connected to 765 kV system has a reactive power range of 520 MVAR production to 270 MVAR absorption. If the per unit proportional gain of voltage regular is to be 0.75 determine the short-circuit level of the system. The SVC has a slope of 3.5%. (16)

12.a Consider a SMIB system in which the synchronous machine is generating 0.92 p.u. MW and 0.3 p.u. MVAR. The voltage of Infinite bus is 0.998+j0.0 p.u. The machine transient reactance is 0.3 p.u. and the transmission line reactance is 0.650 p.u. (a) Calculate what should be the net susceptance of SVC to maintain midpoint voltage at 1 p.u. (b) Calculate synchronizing torque co-efficient with and without SVC at midpoint of the line. (16)

(OR)

12.b Explain the operation of the SVC (FC+TCR) and derive the equations used. Also explain how the SVC is able to regulate the HVAC bus voltage. (16)

13.a Consider the SMIB system in which the synchronous machine is generating 0.8 5pu 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 i) Explain the principle of operation of STATCOM. Show that the steady state stability margin can be enhanced. (12)

ii) Compare STATCOM with SVC. (4)

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

ii) Draw V-I and X-I characteristics curves for single module TCSC and Two module TCSC. (6)

(OR)

14.b Consider a SMIB system generating 0.9 p.u MW and 0.28 p.u MVAR. The infinite voltage is 1 at 0 and the machine transient reactance is 0.3 p.u, transmission line reactance is 0.57 p.u. Calculate.

a) The voltage that has to be injected by SSSC to enhance the power transfer to 0.92 p.u MW

b) Compute the value of degree of compensation that has to be provided to enhance the power transfer to 0.9 p.u. (16)

15.a Explain the principle of coordinated tuning of FACTS controllers using genetic algorithm (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. (16)