B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2012

ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER VII – (REGULATIONS 2008)

EE 9037 EHV POWER TRANSMISSION

Time:3 hrs Max Marks:100

Answer ALL Questions

**Part A – (10×2=20)**

1. The nominal system voltage is 230 kV and corresponding maximum operating voltage is 245 kV. What do you mean by these values?
2. A conductor is described as: ACSR 30/7/3.35. What do you understand by this representation?
3. What is meant by bundle radius?
4. State the significance of different elements in an inductance matrix.
5. List down any two advantages of HVDC system.
6. Define current margin
7. What is meant by SVC?
8. Mention the use of thyristor-switched series reactor.
9. What is meant by secondary shock current?
10. Explain the concept used for the measurement of electrostatic field of an EHV line.

**Part B – (5×16=80)**

11. (i) Write down the equation for power transmission capacity of line with suitable graph and also discuss various methods to improve power transmission capacity of the given line. (6)

(ii) A power of 12,000 MW is required to be transmitted over a distance of 1200 km at voltage levels of 1000kV and 1200 kV. Determine currents transmitted, total power loss and percentage power loss. Compare and interpret the results. The resistance and reactance (Ω/km) values are as follows: $R_{1000}$=0.0036, $R_{1200}$=0.0027, $X_{1000}$=$X_{1200}$=0.231 and δ=30°. (10)

12.a.(i) Explain the procedure for constructing inductance matrix for three phase untransposed and transposed systems. (8)

(ii) The dimensions of a three phase 400kV horizontal line are given as follows. Height of conductor from ground is 15 m and phase separation is 11 m. The conductor is 2×3.18 cm diameter and bundle spacing is 45.72 cm. All the conductors are at same height from ground level. Construct inductance matrix for transposed configuration. (8)

**OR**

b. (i) Describe the diagonalisation procedure for three conductor system. (8)

(ii) Diagonalise the given matrix and interpret the result.

$$[C] = \begin{bmatrix} 10.20 & -1.45 & -0.35 \\ -1.45 & 10.40 & -1.45 \\ -0.35 & -1.45 & 10.20 \end{bmatrix} \text{ nF/km}$$ (8)

13.a Explain a monopolar HVDC link and draw the voltage profile diagram. How is power controlled in this type of link and describe with suitable equations? (16)

**OR**

b. Describe various control methods suitable for rectifier and inverter modes. Draw combined converter and inverter characteristics, showing the power flow directions. (16)

14.a. (i) What is STATCOM? Draw its single line diagram and discuss its role in power systems. (10)

(ii) Discuss the advantages of FACTS controllers? (6)

**OR**

b. (i) What is UPFC? Draw its single line diagram and discuss its role in power systems. (10)

(ii) What is meant by series compensation and state its merits? (6)

15.a. A single circuit line is energized by three phase power frequency supply. Consider a point A(x,y) in coordinate system and discuss the procedure to compute the horizontal component of electrostatic field at point A due to all three phases. Assume suitable assumptions if necessary. (16)

**OR**

b. Explain the effect of electrostatic field produced due to EHV lines on living organisms and heavy vehicles. (16)