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B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2013

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. Show that the power handling capacity of line at a given voltage level decreases with line length.
2. Mention the advantages of ACSR conductors.
3. Draw configuration of 6×3.1 cm conductor
4. State the advantages of diagonalization of given matrix
5. Define current margin
6. Mention various electrical components present in HVDC substation
7. What are the merits of FACTs devices in power system?
8. What do you understand by uncompensated lines?
9. On what principle, electrostatic field is measured?
10. How are pigeons (in cages) affected when placed under EHV lines?

Part B – (5×16=80)

11.(i) Show that percentage power loss depends on conductor resistance. What is the effect of percentage power loss when voltage level is increased? (6)

(ii) A power of 12,000 MW is required to be transmitted over a distance of 1200 km at voltage levels of 400 kV and 1200 kV. Determine number of circuits required ($\delta=30^\circ$), total power loss and percentage loss. (10)

kV	R, ohm/km	X, ohm/km
400	0.031	0.327
1200	0.0027	0.231

12. a.(i) Derive an expression for geometric mean radius of bundled conductor. (8)

(ii) Discuss the effect of equivalent radius of bundled conductor on self-inductance and potential coefficients for number of sub-conductors 2 and 4. Assume same diameter for sub-conductor and bundle radius. (8)

OR

b.(i)Explain the procedure for constructing capacitance 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 capacitance matrix for transposed configuration. (8)

13. a.(i) Discuss the merits of HVDC over HVAC transmission. (6)

(ii) Draw suitable diagrams and explain basic principle of bipolar and homopolar HVDC links. (10)

OR

b. What are the control methods available for controlling power in HVDC link? Describe them and draw combined converter and inverter characteristics, with power flow directions. (16)

14. a.(i) Discuss in detail about series and shunt controllers. (8)

(ii)Explain the basic principle of static synchronous compensator and list out its advantages. (8)

OR

b. Write short notes on SVC and UPFC. (16)

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. Consider a double circuit line, one circuit is energized and other is un-energized. Explain the procedure to compute the voltage induced in fourth conductor in the unenergized circuit. (16)