B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2011

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. How is power handling capacity of a transmission line increased for the given voltage rating?
2. Mention the highest transmission voltage in India.
3. What is the effect on resistance due to stranding of conductors?
4. State the advantages of bundled conductors.
5. List out the applications of HVDC transmission system.
6. Draw the bridge inverter equivalent circuit
7. Why are FACTS devices used in power system?
8. How is reactive power controlled in power system using transformer?
9. What is meant by primary shock current?
10. Explain briefly about let-go current.

Part B – (5×16=80)

11. A power of 2000 MW is to be transmitted from station A over 800 km to station B. Use 400kV and 750 kV as alternatives. Suggest the number of circuits required with 50% series capacitor compensation, and calculate total power loss, percentage power loss and loss per km. Derive relevant required expressions. R and X values are given below.

(16)

kV	R, ohm/km	X, ohm/km
400	0.031	0.0136
750	0.327	0.272

12. a.(i) Explain the fundamental concepts of inductance and derive the elements of Maxwell's coefficient matrix for multi-conductor lines. (8)

(ii) A three phase 750kV horizontal line has a minimum height: 12 m, sag at mid-span: 12m, phase spacing: 15 m. Conductors are 4×0.035m with bundle spacing of 0.4572 m. Calculate inductance matrix for untranposed and transposed configurations. (8)

OR

b. Diagonalise the given capacitance matrix [C], of a 400kV horizontal line configuration. Interpret the eigen vectors, which are obtained and explain with respect to modes of propagation.

$$[C] = \begin{bmatrix} 9.77 & -1.65 & -0.58 \\ -1.65 & 10.02 & -1.65 \\ -0.58 & -1.65 & 9.77 \end{bmatrix}$$ (16)

13. a. (i) Explain the principle of operation of HVDC system. (8)

(ii) Discuss and compare the merits and demerits of HVAC and HVDC system. (8)

OR

b. Describe combined converter and inverter characteristics of HVDC system. (16)

14. a. (i) Draw single line diagram of STATCOM based voltage sourced and current sourced converter. Explain their functions also. (8)

(ii) Describe the role of series capacitor in power system. (8)

OR

b.(i) Explain the functions of thyristor controlled reactor and thyristor switched reactor with suitable diagrams. (8)

(ii) Discuss UPFC with suitable model, which is used in power system (8)

15. a. Given a double circuit AC transmission line. One circuit is energized and other circuit is un-energised. Compute the induced voltage on un-energised middle conductor. (16)

OR

b. (i) State the principle used for measurement of electrostatic field? Describe the application rules followed while measuring it. (8)

(ii) Explain the effect of electrostatic field due to EHV line on living organisms. (8)