Question Bank

Subject: Extra High Voltage AC Transmission System

CBCS (w.e.f. – June 2021)

Class: Final Year B.Tech (Electrical) Sem-II

I. Four Marks Questions:

1. Write a short note on Aeolian Vibration.
2. State the effect of bundled conductors on its inductance.
3. Derive the expressions for resistance and inductance of ground return.
4. Explain in detail advantages and disadvantages of high voltage
5. Describe the line parameters of modes of propagation.
6. Write a short note on Galloping Vibration.
7. Explain in detail the sequence inductance and capacitance.
8. What are the different mechanical considerations in EHV line performance?
9. What are the properties of bundled conductors in EHVAC lines?
10. Explain the relation between temperature rise and current carrying capacity of EHVAC line.
11. Write short notes on distribution of voltage gradient on sub-conductors of bundle.
12. Write a short note on attenuation of travelling waves on transmission line.
13. Explain field of sphere gap.
14. What is corona? Explain corona loss formulas in detail.
15. Explain surface voltage gradients on conductors in EHVAC
16. Explain reflection and refraction of travelling waves.
17. What is standing wave? Derive equation for open ended line double exponential response.
18. Derive differential equations and solutions for general case in travelling waves.
19. Derive equation for open ended line response to sinusoidal excitation.
20. Derive equation for line energization with trapped charge voltage.
21. Write a short note on sinusoidal excitation lumped parameter circuit.
22. Write a short note on ferro-resonance over voltages.
23. Write a short note on reduction of switching surge over voltages in EHV systems.
24. Write down the sources/causes of over voltages.
25. Explain recovery voltage and circuits breakers and its impact on over voltages.
26. Write a short note on calculation of switching surges single phase equivalents.
27. Explain the term power circle diagram and its use.

28. Write a short note on static reactive compensating system.
29. Derive the expressions for generalized constants.
30. Explain sub-synchronous resonance problem and counter measures.
31. A 100 MVA 230kV 50 Hz transformer has xt = 12% and is connected to a line 200 km long which has an inductance of 1 mH/km. The filter, connected to the LV 33 kV side of the transformer, is required to suppress the 5th harmonic generated by the TCR to 1% of In. Calculate the value of filter capacitor if the filter inductance used is 2mH.
32. Write a short note on sub-synchronous resonance in series capacitors compensated lines.
33. Explain voltage control using synchronous condenser.
34. What are the factors under steady state in design of EHV lines?
35. Explain line insulation design based upon transient overvoltages in detail.
36. Write a short note on conductor-tower, conductor-ground and conductor-conductor clearances.
37. Write a short note on air gap clearance for power frequency and lightning.

II. Six Marks Questions:

1. A power of 12000 MW is required to be transmitted over a distance of 1000 km. At voltage levels of 400 kV, 750 kV, 1000 kV and 1200 kV determine: a) Possible no. of circuits required with equal magnitudes for sending and receiving end voltages with 30° phase difference. b) The currents transmitted; and c) The total line losses Assume the value of x = 0.327, 0.272, 0.231, 0231 ohm/km for 400, 750, 1000, 1200 kV respectively.
2. Derive the equation for inductance in EHVAC transmission system.
3. Derive the equation for capacitance in EHVAC transmission system.
4. Compare various EHVAC transmission lines on the basis of power handling capacity and losses for different voltages.
5. Explain the charge potential relations of multi-conductor lines.
6. Derive equation of surface voltage gradients on conductors in EHVAC
7. Derive the expression $P_C = \frac{1}{2} KC\ (V_m^2 - V_0^2)$ for the energy loss from charge-voltage diagram.
8. Derive the expression for reflection and refraction of travelling waves.
9. What is standing wave? Derive equation for open ended line double exponential response.
10. Derive differential equations and solutions for general case in travelling waves.
11. Derive the expression sinusoidal excitation lumped parameter circuit.
12. Explain the methods of reduction of switching surge over voltages in EHV systems.
13. Explain calculation of switching surges single phase equivalents.

14. Derive the expressions for generalized constants of transmission line.
15. Explain sub-synchronous resonance problem and counter measures.
16. A 100 MVA 230kV 50 Hz transformer has xt = 12% and is connected to a line 200 km long which has an inductance of 1 mH/km. The filter, connected to the LV 33 kV side of the transformer, is required to suppress the 5th harmonic generated by the TCR to 1% of In. Calculate the value of filter capacitor if the filter inductance used is 2mH.
17. Explain the factors under steady state in design of EHV lines?
18. Explain line insulation design based upon transient overvoltages in detail.
19. Explain conductor-tower, conductor-ground and conductor-conductor clearances.