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B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2011

ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER IV – (REGULATIONS 2008)

EE9251– TRANSMISSION AND DISTRIBUTION

Time:3 hrs Max Marks:100

Answer ALL Questions

Part A – (10×2=20)

1. Why is three phase four wire system used in power distribution?
2. What is a feeder?
3. What is self GMD?
4. Define skin effect
5. What do you mean by surge impedance? Give its value for GIS
6. Explain corona effect in EHV line
7. Define string efficiency
8. Describe any one method of laying underground cable
9. State the use of stringing chart
10. Why is it disadvantageous to have either too low or too high sag?

Part B – (5×16=80)

11. (i) Draw the current loading diagram and voltage drop diagram for uniformly loaded distributor of length 'l', after deriving suitable expressions. Also derive the formula for finding power loss in the whole distributor. (8)

    (ii) State the advantages and disadvantages of HVAC and HVDC systems. Compare (8)

12. a.(i) Show that the inductance per unit length of an overhead line due to internal flux linkages is constant and is independent of size of conductor. (8)

    (ii) An overhead line 50 km in length is to be constructed with conductors 2.56 cm in diameter, for single phase transmission. The line reactance must not exceed 31.4 Ω. Find the maximum permissible spacing. (8)

OR

b. (i) Derive from first principles the capacitance per km to neutral of a three phase overhead transmission line with unsymmetrical spacing of conductors assuming transposition. (8)

(ii) A three phase, 50Hz, 132 kV overhead line has conductors placed in a horizontal plane 4.56 m apart. Conductor diameter is 22.4mm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition. (8)

13. a. Determine the sending end voltage, current, power factor of a single phase 50Hz, 76.2 kV transmission delivering a load of 12 MW at 0.8 power factor. The line constants are resistance 25 Ω, inductance 200 mH and capacitance between lines 2.5μF. Also determine the regulation and efficiency of transmission. Use nominal π method. Draw phasor diagram with calculated values. (16)

OR

b. Determine efficiency and regulation of a three phase, 50 Hz 150 km long transmission line having three conductors spaced 3.5 m delta formation when the receiving end delivers 25 MVA at 120 kV and power factor 0.9 lagging. The resistance of the conductor is 0.25 Ω /km and effective diameter is 0.75 cm. Use exact solution methods. (16)

14.a.(i) Describe various types of transmission line insulators. (8)

(ii)A string of eight suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If the capacitance of the top unit is 10 times the capacitance to ground of each unit, determine the capacitance of the remaining seven units. (8)

OR

b. (i) Explain any four insulating materials used in manufacturing of cables. (8)

(ii) Find the economic size of a single core cable working on a 132 kV three phase system, if a dielectric stress of 60 kV/cm can be allowed. (8)

15.a. Derive expressions for sag and tension in a power conductor strung between two supports at equal heights taking in to account the wind and ice loadings also. (16)

OR

b. (i) What is the necessity of neutral earthing? Explain. How will you measure the earth resistance? (8)

(ii) Draw the 230/110 kV substation layout, and describe the function of each electrical equipment. (8)