B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2012

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. What is meant by distributor?
2. Why is power transmitted at high voltage?
3. Distinguish between self GMD and mutual GMD.
4. What is ACSR?
5. State Ferranti effect
6. Define transmission efficiency
7. Discuss briefly capacitance grading with respect to insulators
8. A single core cable, 2.1 km long, has a conductor radius of 13mm and an insulation thickness of 5.8mm. The dielectric has a relative permittivity of 2.8. Find the capacitance per meter length of cable.
9. State the advantages of RCC poles. In which voltage level, these are used?
10. Write briefly about tower spotting.

Part B – (5×16=80)

11. (i) Consider a distributor loaded with uniform loading of i ampere per meter run and are fed from two end feeding points at different voltages. Find the point of minimum potential occurrence in the distributor. (8)

    (ii) A 800m long, two wire DC distributor fed from both ends, is loaded uniformly at the rate of 1.2 A/m run. If the resistance of the distributor is 0.1Ω/km (go and return) and feed points are maintained at 245V and 240V respectively, calculate the minimum voltage, its point of occurrence and current supplied from two feeding points. (8)

12. a. From the fundamentals, derive the expression for loop inductance of a single phase, two wire (solid) system. (16)

OR

b. Derive from first principles the capacitance per km to neutral of a three phase overhead transmission line with unsymmetrical spacing of conductors assuming transposition. Also explain, how transposition helps in equalizing the capacitances for the

unsymmetrical configuration. (16)

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

OR

b. A three phase 50Hz transmission line has resistance, inductance and capacitance per phase of 10 Ω, 0.1 H and 0.9 μF respectively and delivers a load of 35 MW at 132 kV and 0.8 power factor lagging. Determine sending end voltage, sending end current, transmission efficiency and regulation of the line. Use T model. (16)

14.a.(i) Explain the role of static shielding in insulators. (6)

(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. (10)

OR

b. (i) Derive the expression for electric stress in a single core cable. (6)

(ii) Find the maximum working voltage of a single core cable having two insulating materials **A** and **B** and the following data. Conductor radius 0.5 cm, inside sheath radius 2.5 cm, maximum working potential gradient of **A** 60 kV/cm, maximum working potential gradient of **B** 50 kV /cm, relative permittivities of **A** and **B**, 4 and 2.5 respectively. (10)

15.a.Assuming the shape of parabola, deduce expressions for calculating sag and conductor length. How can the effect of wind and ice loadings are taken into account? (16)

OR

b. Describe any four methods to earth the neutral of the power system. (16)