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Question Paper Code : 27215

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fourth Semester

Electrical and Electronics Engineering

EE 6402 — TRANSMISSION AND DISTRIBUTION

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why is power transmitted at high voltage?
2. What is meant by feeder?
3. Distinguish between self and mutual GMD.
4. Mention the advantages of transposition of conductors
5. Define transmission efficiency.
6. Write the formula for finding surge impedance of transmission line.
7. A single core cable, 1.7 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.
8. Define string efficiency.
9. What is meant by tower spotting?
10. What is meant by sag template?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive suitable expressions, draw current loading diagram and voltage drop diagram for uniformly loaded distributor of length 'f' fed at one end. How is power loss in the whole distributor computed? (8)

(ii) A uniform two wire DC distributor 250m long is loaded with 0.4 A/m and is fed at one end. If the maximum permissible voltage drop is not to exceed 10V, find the cross sectional area of the distributor conductor. Take $\rho = 1.78 \times 10^{-8}$ Ωm. (8)

Or

(b) (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 0.1 Ω/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) Derive an expression for loop inductance of a single phase transmission 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. (16)

13. (a) Draw the nominal T circuit of a medium length transmission line and derive expressions for sending end voltage and current. Also draw the respective phasor diagram. (16)

Or

(b) Show that the real power transferred is dependent on the power angle and the reactive power transferred is dependent on the voltage drop in the line. (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) Explain any four insulating materials used in manufacturing of cables. (6)

(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. (10)

15. (a) Assuming that the shape of an overhead line can be approximated by a parabola, deduce expressions for calculating sag and conductor length. How can the effect of wind and ice loadings be taken into account? (16)

Or

(b) Describe any four methods of power system grounding. (16)

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