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Question Paper Code : 10576

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025.

Fourth Semester

Electrical and Electronics Engineering

EE 8402 – TRANSMISSION AND DISTRIBUTION

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the factors on which the skin effect depends upon.
2. Write the equation for loop inductance of the two-wire line.
3. What is surge impedance loading and the range for an overhead transmission line?
4. Mention the factors that govern the performance of a transmission line.
5. Why are suspension insulators preferred for high voltage power transmission?
6. Write the drawbacks of providing too small or too large sag on a line.
7. Name any four of the insulating materials used in cables.
8. A single core cable has a conductor diameter of 1 cm and internal sheath diameter of 1.8 cm. If impregnated paper of relative permittivity 4 is used as the insulation, calculate the capacitance for 1 km length of the cable.
9. Compare EHVAC and HVDC transmission systems.
10. Name any four FACTS controllers used in AC transmission system.

PART B — ($5 \times 13 = 65$ marks)

11. (a) Derive the equation for inductance of a 3-phase overhead line for symmetrical and unsymmetrical spacing

Or

- (b) Determine the inductance per km of a 3-phase transmission line using conductor of 20mm diameter and the conductors are at the corners of a triangle with spacing of 4, 5 and 6 meters. The conductors are regularly transposed.

12. (a) Show how regulation and transmission efficiency are determined for medium lines using

(i) Nominal T method (6)

(ii) Nominal π method (7)

Illustrate your answer with suitable vector diagrams.

Or

- (b) Explain in detail the concept of corona, theory of corona formation and the factors affecting corona. Also discuss about the methods of reducing corona effect.

13. (a) Obtain the calculation of sag when supports are at equal levels and at unequal levels. Also discuss the effect of wind and ice loading on sag calculation.

Or

- (b) An insulator string consists of three units, each having a safe working voltage of 15 kV. The ratio of self-capacitance to shunt capacitance of each unit is 8:1. Find the maximum safe working voltage of the string. Also find the string efficiency.

14. (a) Describe in detail any two methods of grading the cable.

Or

- (b) A 66-kV single-core lead sheathed cable is graded by using two dielectrics of relative permittivity 5 and 3 respectively; thickness of each being 1 cm. The core diameter is 2 cm. Determine the maximum stress in the two dielectrics.

15. (a) Describe in detail the various techniques of voltage control and power factor improvement. Also outline the causes of low power factor.

Or

- (b) Discuss the types of substations in detail and explain the functions of various equipment employed in the substation.

PART C — ($1 \times 15 = 15$ marks)

16. (a) The three conductors of a 3 phase line are arranged at the corners of a right angled isosceles triangle. If each equal side of this triangle is 2 m, find line-to-neutral capacitance per km. Take the diameter of each conductor as 1.24 cm. The conductors are transposed at regular intervals.

Or

- (b) An overhead line has a span of 150 m between level supports. The conductor has a cross-sectional area of 2 cm^2 . The ultimate strength is 5000 kg/cm^2 and safety factor is 5. The specific gravity of the material is 8.9 gm/cc . The wind pressure is 1.5 kg/m . Calculate the height of the conductor above the ground level at which it should be supported if a minimum, clearance of 7 m is to be left between the ground and the conductor.
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