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10EE53

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Transmission & Distribution

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Draw the line diagram of a typical power supply scheme indicating the standard voltages. **(06 Marks)**

b. Explain the following components of distribution:
(i) Substation (ii) Distribution substation (iii) Feeder (iv) Distributor
(v) Service mains **(10 Marks)**

c. State the advantages of high voltage transmission. **(04 Marks)**

2 a. Prove that the conductor takes the shape of a catenary when the sag and span are comparable. **(10 Marks)**

b. An overhead transmission line conductor is supported between two towers 300 m apart, having a difference in level of 10 m. The conductor diameter is 2.0 cm and weight is 2.3 kg/m. Calculate the sag under lower support if factor of safety is 3. The maximum tensile strength of conductor material is 4200 kg/m^2. **(10 Marks)**

3 a. (i) Discuss the desirable properties of insulators.
(ii) Compare pin type insulator and suspension type insulator.
(iii) Why string efficiency should be as high as possible? What are different methods used in practice for improving the string efficiency? **(12 Marks)**

b. Each line of a three phase system is suspended by a string of three similar insulators. If the voltage across the line unit is 20 KV, calculate the line to neutral voltage and string efficiency. Assume that the shunt capacitance between each insulator and earthed metal work of tower to be $\frac{1}{10}^{th}$ of the capacitance of the insulator. **(08 Marks)**

4 a. State and explain factors affecting corona and corona loss. **(06 Marks)**

b. A 132 KV, 3-phase line with 1.956 cm diameter conductor is built so that corona takes place if the line voltage exceeds 210 KV (rms). If the value of potential gradient at which ionization occurs can be taken as 30 KV per cm, find the spacing between the conductors. (Assume $\delta = 1$, $m_0 = 1$). **(04 Marks)**

c. What is meant by grading of cables? Briefly explain various methods of grading. **(10 Marks)**

PART – B

5 a. Calculate the inductance of conductor due to internal flux and external flux. **(10 Marks)**

b. Write short note on transposition of transmission line. **(05 Marks)**

c. Calculate the inductance of each conductor in a 3-phase-3wire system. Conductors are arranged in a horizontal plane with spacing $d_{31} = 4m$, $d_{12} = d_{23} = 2$ m. The conductors are transposed and have a diameter of 2.5 cm. **(05 Marks)**

6 a. Find the capacitance of single phase line 40 km long consisting of 2 parallel wires each 4 mm in diameter and 2 m apart. Determine the capacitance of the same line taking into account effect of ground. The height of conductor above ground is 5 m. **(08 Marks)**

b. Derive expression for the capacitance per phase of a 3-phase line with
(i) Equilateral spacing.
(ii) Unsymmetrical spacing (single circuit) transposed. **(12 Marks)**

7 a. What are generalized circuit constants of a transmission line? Determine the ABCD constants of a medium transmission line using nominal T-model and prove AD – BC = 1. **(10 Marks)**

b. A 3-phase 50 Hz overhead transmission line has the following constants per phase $R = 28\ \Omega$, $X = 63\ \Omega$, $Y = 4 \times 10^{-4}\ \mho$. If the load at receiving end is 75 MVA at 0.8 p.f. lag with 132 KV between lines. Calculate the voltage, current and p.f. at the sending end. Use nominal π method. **(10 Marks)**

8 a. Write short note on radial and ring main distribution system. **(06 Marks)**

b. What are the requirements of a good distribution system? **(04 Marks)**

c. A two wire DC distributor AB 600 m long is loaded as under,

Distance from A (meters)	150	300	350	450
Load in amperes	100	200	250	300

The feeding point A is maintained at 440 V while B maintained at 430 V. If each conductor has resistance of 0.01 Ω per 100 m.
Calculate :
(i) The current supplied from A and B.
(ii) The power dissipated in the distributor. **(10 Marks)**

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