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10EE53

Fifth Semester B.E. Degree Examination, June/July 2016
Transmission and Distribution

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain the typical line diagram of transmission and distribution scheme, indicating the standard voltages. **(06 Marks)**

b. Explain the effects of high voltage transmission base on the conductor volume, transmission efficiency, percentage line drop. **(08 Marks)**

c. What are the different types of transmission systems? Explain the advantages and disadvantages of high voltage transmission. **(06 Marks)**

2 a. Derive an expression for SAG of a line conductor suspended between unequal level supports taking into the effect of ice and wind loading. **(08 Marks)**

b. The towers of height 30 m and 90 m supports a transmission line conductor at water crossing. The distance between the towers is 500 m. If the tension in the conductor is 1600 kg. Find the minimum clearance of the conductor and water and the clearance between midway to their supports. Weight of conductor is 1.5 kg/m. Bases of the towers can be considered to be at water level. **(08 Marks)**

c. Discuss the significances of sag and tension calculations. **(04 Marks)**

3 a. Explain the different methods of improving the string efficiency of insulator for equal voltage distribution. **(09 Marks)**

b. A 3 phase overhead transmission line is supported by three disc suspension type insulators. The potential across the first and second insulator is 8 KV and 11 KV respectively. calculate the : i) line voltage ii) the ratio of shunt capacitance to self capacitance iii) string efficiency. **(06 Marks)**

c. Explain the different types of insulator testing. **(05 Marks)**

4 a. Explain the Ciorona formation in overhead T_r in terms of V_d and V_v lines. And the factors affecting the corona power loss. **(08 Marks)**

b. Derive an expression for insulation resistance of a single core cable. **(06 Marks)**

c. A single core cable,, 2.5 km long has a conductor of radius 15 mm and an insulation thickness of 5.6 mm. The dielectric has a resistivity of 8×10^{12} ohm/mt, and a relative permittivity of 2.8. Find the insulation resistance and capacitance per meter length of the cable. **(06 Marks)**

PART – B

5 a. Derive an expression for inductance of a 3 phase line with unsymmetrical spacing but transposed. **(10 Marks)**

b. Find the inductance per phase per km of double circuit 3 phase line system is shown in the Fig.Q5(b). The conductors are transposed and are of radius 0.75 cm each. The phase sequence is ABC. **(10 Marks)**

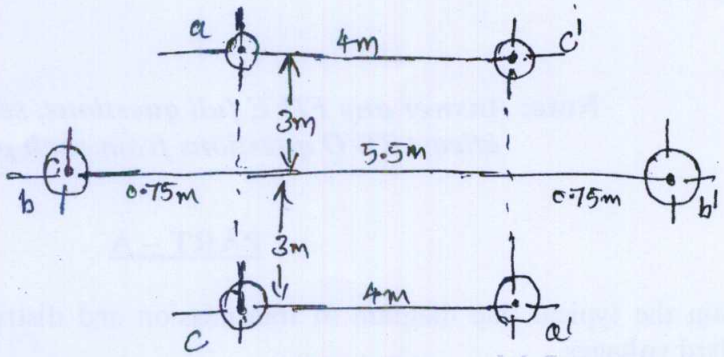

Fig. Q5(b)

6 a. Derive an expression for the capacitance per phase with equilateral spacing. **(10 Marks)**

b. A 3 phase, 50 Hz, 6 KV overhead line conductors are placed in a horizontal plane as shown in Fig. Q6(b). The conductor diameter is 1.25 cm. If the line length is 100 km. Calculate the capacitance per phase and charging current per phase. Assume complete transposition of lines. **(06 Marks)**

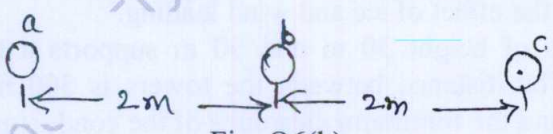

Fig. Q6(b)

c. Write a note on transposition of line. **(04 Marks)**

7 a. Derive an expression for sending end and receiving end voltage and currents for a nominal T model of medium transmission line. Also draw the phasor diagram. **(10 Marks)**

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

8 a. Explain how a two wire DC distributor with concentrated load fed at both end can be represented by single line diagram. **(08 Marks)**

b. A 3 phase ring distributor ABCD, fed at A at 11 KV supplies balanced loads of 40 A at 0.8 pf lag at B, 50 A at 0.707 pf lagging at C and 30 A at 0.8 pf lagging at D. The load currents are referred to the supply voltage at A. The impedances of the various sections are :
Section AB = $(1 + j2)\Omega$, section BC = $(2 + j3)\Omega$
Section CD = $(1 + j1)\Omega$, section DA = $(3 + j4)\Omega$
Calculate the currents in each section and station bus bar voltages at B, C and D, **(12 Marks)**

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