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10EE53

Fifth Semester B.E. Degree Examination, June/July 2017
Transmission and 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 and explain a typical power supply scheme indicating the standard voltages. **(07 Marks)**

b. Explain the advantages of high voltages transmission and state the limitations of increasing transmission voltage levels. **(08 Marks)**

c. What are the difference between feeder and distributer? **(05 Marks)**

2 a. Name the different components of an overhead line. Also explain the purpose for which they are used. **(05 Marks)**

b. Obtain the expression for sag when the supports are at equal level. Explain also the effects of wind and ice coating on sag. **(08 Marks)**

c. An overhead transmission line having a parabolic configuration is supported from two supports of unequal heights 80m and 70m above ground. The horizontal distance between supports is 170m. find the min clearance between the conductor and ground, if the tension in the conductor is 900kg, weight of conductor 0.4kg/m and factor of safety = 2. **(07 Marks)**

3 a. What are the types of insulators used in over head lines? Explain suspension type of insulator. **(06 Marks)**

b. Define string efficiency. Explain the method of static shielding to improve string efficiency. **(07 Marks)**

c. A string of 4 insulators has self capacitance equal to 4times the pin to earth capacitance calculate: i) Voltage distribution across various units as percentage of total voltage across the string ii) String efficiency. **(07 Marks)**

4 a. Explain corona phenomena. Discuss the disadvantages of corona. **(06 Marks)**

b. Derive the expression for minimum and maximum dielectric stress in a single core cable. Hence prove that $\frac{G\,max}{g\,min} = \frac{D}{d}$.

Where D = sheath diameter d = is the core diameter. **(08 Marks)**

c. A single core cable employing three layers of insulation with dielectric constants $\in_{r1} = 5$, $\in_{r2} = 4$, and $\in_{r3} = 3$ respectively has a conductor of radius 1cm. Assuming that all the three insulating materials are worked at the same maximum potential gradient. Find the safe working voltage of the cable. The inner radius of the sheath is 2.5cm and maximum potential gradient is 40kV/cm. **(06 Marks)**

PART – B

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

b. A single phase line consists of two circuits in parallel as shown in Fig Q5(b). Conductors a and a' in parallel form one conductor while b and b' in parallel form the return path. Calculate the total inductance of the line per km assuming that current is equally shared by the two parallel conductors. The diameter of each conductor is 20mm. **(06 Marks)**

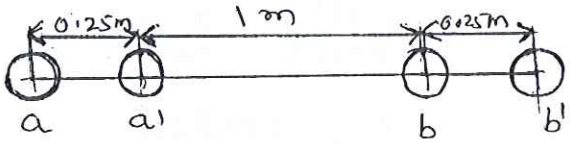

Fig Q5(b)

c. What is skin effect? On what factors it depends? **(04 Marks)**

6 a. Derive an expression for line to neutral capacitance for 3 phase overhead line when conductors are symmetrically placed. **(10 Marks)**

b. A 3 phase 50Hz transmission line is arranged as follows Fig Q6(b). The conductor diameter is 1.2cm. The voltage of the line is 110kV. Find the capacitance to neutral and charging current per km. **(06 Marks)**

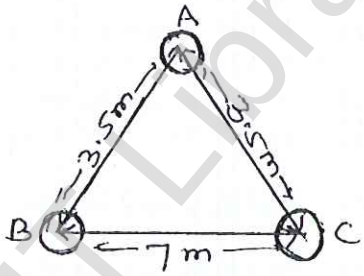

Fig Q6 (b)

c. Write a short note on transposition of transmission lines. **(04 Marks)**

7 a. Obtain expressions for sending end voltage and current in terms of ABCD constants and receiving end voltage and current for a nominal – T model of transmission line. Also draw the phasor diagram. **(10 Marks)**

b. A 3 phase 50Hz transmission line has following: constants R = 25Ω, X_L = 65Ω, $Y = 4 \times 10^{-4}$ ℧. If the load at the receiving end is 50 MW at p.f of 0.85 lagging with 132kV between lines. Calculate sending end voltage, current and pf. Use nominal – π method. **(10 Marks)**

8 a. Compare radial and ring main distribution systems. **(05 Marks)**

b. Derive an expression for voltage drop for a uniformly loaded. DC distributer fed at one end. Draw the current loading and voltage drop diagram. **(05 Marks)**

c. A distributor AB is fed from both ends. At feeding point A the voltage is maintained at 235V and at B 236V. The total length of feeder is 200m and loads are as shown in Fig Q8(c). The resistance per 100meters of one conductor is 0.04Ω. Calculate the current in various sections of the feeder and the minimum consumer voltage. **(10 Marks)**

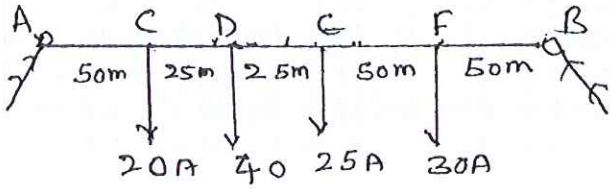

Fig Q8(c)

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