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10EE53

Fifth Semester B.E. Degree Examination, May 2017
Transmission and Distribution

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. ***Assume any missing data.***

PART – A

1 a. What are the advantages and limitations of high voltage AC transmission? **(05 Marks)**
b. Draw the line diagram of a typical power scheme indicating the standard voltages used at different stages. **(08 Marks)**
c. With diagram, explain feeder, distributor and service mains of a distribution scheme. **(07 Marks)**

2 a. What is Sag in conductors? Derive the expression for the sag when the supports are at equal heights. **(07 Marks)**
b. Explain how the wind and ice effects the sag of an overhead transmission line. **(05 Marks)**
c. An overhead line at a river crossing is supported from two towers of heights 30mts and 90 meters above water level with a span of 300 meters. The weight of the conductor is 1kg/meter and the working tension is 2000 kg. Determine the clearance between the conductor and the water level mid – way between the towers. **(08 Marks)**

3 a. Define String efficiency. How the string efficiency of an insulator is improved by using different methods? **(10 Marks)**
b. Each line of a 3 phase system is suspended by a strip of three similar insulators, if the voltage across the line unit is 20 KV, calculate the line to neutral voltage and the string efficiency, assume that the shunt capacitance between each insulator and earthed metal work of tower to be 1/10 of capacitance of insulator. **(10 Marks)**

4 a. Define Disruptive critical voltage and visual critical voltage and write down the expressions for the same. **(08 Marks)**
b. Explain the general construction of an underground cable, with neat sketch. **(08 Marks)**
c. Define an expression for the insulator resistance of the cable. **(04 Marks)**

PART – B

5 a. Derive an expression for inductance of a single phase two wire transmission line. **(12 Marks)**
b. A 3 phase, 3 wire transmission line consisting of 2 cm diameter conductor space 4 centimeter apart in a horizontal plane as shown in fig. Q5(b) supplies a balanced load. Calculate inductance / km of each conductor between line to neutral. What will be the average inductance of each phase if conductors were regularly transposed? **(08 Marks)**

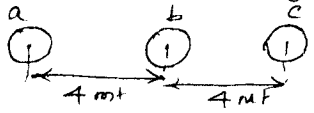

Fig.Q5(b)

6 a. Derive an expression for the capacitance / phase of a 3 phase line with unsymmetrical spacing but transposed. **(08 Marks)**

b. What is the effect of earth on the capacitance of single phase transmission line? **(04 Marks)**

c. Find the capacitance of single phase, 40km long consisting of 2 parallel wires each 4mm in radius and 2 meter apart, determine the capacitance of same line taking into the account of effect of ground. The height of conductor above the ground is 5mt. **(08 Marks)**

7 a. Deduce an expression for regulation and efficiency of a medium transmission line using nominal π method. Explain with phasor diagram. **(06 Marks)**

b. For a short transmission line, derive expressions for A, B, C and D constants and thereby show that $AD - BC = 1$. **(06 Marks)**

c. A 3 phase, 50Hz, overhead transmission line delivers 10MW at 0.8pf lagging at 66KV. The resistance and inductive reactance of the line per phase are 10Ω and 20Ω respectively while capacitive admittance $Y_c = 4 \times 10^{-4}$ mho. Calculate i) sending end voltage (line to line value) ii) sending end current iii) sending end power factor iv) transmission efficiency, use nominal 'T' method. **(08 Marks)**

8 a. Explain how a D.C. distributor with concentrated loads fed at both ends with equal voltages is analyzed. **(10 Marks)**

b. A single phase distributor AB is 500m long and is fed at A and it is loaded as follows : i) 100A @ 0.8 pf lag 200m from 'A' ii) 150A @ 0.707 pf lagging @ 500m from 'A'. The total resistance and reactance of the distributor are 0.2Ω and 0.1Ω per km respectively. If the receiving end voltage is 400V, find the sending end voltage. **(10 Marks)**

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