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10EE53

Fifth Semester B.E. Degree Examination, December 2012
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 the line diagram of a typical transmission and distribution scheme indicating the standard voltages and also explain feeder, distributor and services main of a distribution scheme. **(10 Marks)**

b. Why it is necessary to use high voltage for power transmission? And state the effect of high voltage used in transmission on:
   i) Volume of copper required
   ii) Line efficiency
   iii) Line voltage drop. **(10 Marks)**

2 a. Give the list of supporting structures and the main components used in overhead transmission line. **(05 Marks)**

b. What is sag in a conductor? Derive the expression for the sag when the supports are at equal heights. **(07 Marks)**

c. A transmission line conductor at a river crossing is supported from two towers of height of 40m and 30m respectively above water level. The horizontal distance between the towers is 300m. If the tension in the conductor is 1500 kg, find the clearance of the conductor at a point midway between the supports. Weight of the conductor is 0.8 kg/m. Assume bases of the tower to be at the water level. **(08 Marks)**

3 a. State the various properties of an insulator. Give the list of important insulators and make the comparision of pin and suspension type insulators. **(07 Marks)**

b. Define string efficiency. Explain the method of calculating the string efficiency for a given three insulator string. **(07 Marks)**

c. An insulator string consists of 3 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. **(06 Marks)**

4 a. Explain the following terms with reference to corona:
i) Disruptive critical voltage; ii) Visual critical voltage; iii) Corona power less. **(06 Marks)**

b. Compare the underground cables and over head line systems and give the list of various types of underground cables. **(06 Marks)**

c. A single core lead covered cable has a conductor diameter of 3cm with insulation diameter of 8.5 cm. The cable is insulated with two dielectrics with permittivities 5 and 3 respectively. The maximum stresses in the two dielectrics are 38 KV/cm and 26 KV/cm respectively. Calculate radial thickness of insulating layers and the working voltage of the cable. **(08 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – B

5 a. Derive an expression for inductance of a single phase, two-wire transmission line. **(07 Marks)**

b. Explain the terms self GMD and mutual GMD. **(06 Marks)**

c. A three phase transmission line has conductor diameter of 1.8cm each, the conductors being spaced as shown in the Fig.Q.5(c). The loads are balanced and the line is transposed. Find the inductance per phase of 50 km long transmission line. **(07 Marks)**

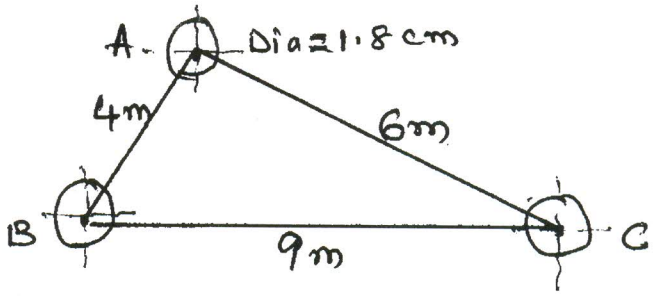

Fig.Q.5(c)

6 a. Deduce an expression for line to neutral capacitance for 3 phase overhead transmission line with equilateral spacing. **(08 Marks)**

b. Write a short note on transposition of conductors. **(04 Marks)**

c. A single phase overhead line 30km long consists of two parallel wires each 5mm in diameter and 1.5m apart. If the line voltage is 50KV at 50Hz. Calculate the line capacitance per km and the charging current with the line open circuited. **(08 Marks)**

7 a. Explain how the transmission lines are classified. **(04 Marks)**

b. Deduce an expression for transmission efficiency and regulation for medium transmission line using nominal T method. **(08 Marks)**

c. A single phase overhead transmission line delivers 1100 kW at 33KV at 0.8 p.f. lagging. The load resistance and inductive reactance of the line are 10 ohms and 15 ohms respectively. Determine:

i) Sending end voltage

ii) Sending end power factor

iii) Line efficiency with circuit and vector diagrams. **(08 Marks)**

8 a. List down the necessary requirements of a power distribution system. **(04 Marks)**

b. Explain the radial and ring main distribution system, bring out their merits and demerits. **(08 Marks)**

c. A two wire D.C. distributor AB, 600m long, is loaded as under. Distance from A (meters) 150, 300, 350, 450. Loads in amperes 100, 200, 250, 300. The feeding point A is maintained at 440V and that of B at 430V. If each conductor has a resistance of 0.01Ω per 100 meters. Calculate:

i) The current supplied from A and B.

ii) The power dissipated in the distributor. **(08 Marks)**

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