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10EE53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Transmission and Distribution

Time: 3 hrs. Max. Marks:100

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

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 – A

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

b. Discuss the effect of high voltage in transmission system. **(08 Marks)**

c. Write short notes on : i) Feeders ii) Distributors and iii) Service mains. **(06 Marks)**

2 a. Derive an expression for the sag, in a over head line conductors, when supports are at different levels and considering the effect of wind and Ice on it. **(08 Marks)**

b. Write a note on sig template. **(04 Marks)**

c. An overhead line at a river crossings is supported form two towers at heights of 50m and 85m above the water level, the horizontal distance between the towers being 450m. If the maximum tension is 3980kg and the conductor weight 1.726kg/m. Find :
i) Minimum clearance ii) The clearance between the conductor and the water level at a point, midway between the towers. **(08 Marks)**

3 a. Name the different types of insulators used in transmission and distribution systems. Draw and explain the construction of Hewleft type insulator. **(06 Marks)**

b. Define strings efficiency. Explain the use of guard ring for improving the string efficiency and derive an generalized expression for capacitance connected to guard rings. **(07 Marks)**

c. In a 5 insulator disc string, capacitance of each unit and earth is $\frac{1}{6}$th of the mutual capacitance. Find the voltage distribution across each insulator in the string, as a percentage of voltage of conductor to earth. Find also the string efficiency. **(07 Marks)**

4 a. Define corona. With reference to corona, derive an expression for disruptive critical voltage and visual critical voltages. **(08 Marks)**

b. Mention the requirements of an underground cable. **(04 Marks)**

c. Derive an expression for the insulation resistance of a single core cable. **(08 Marks)**

PART – B

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

b. Derive an expression for line to neutral capacitance for a 3 phase overhead transmission line, when the convertors are unsymmetrically spaced. **(08 Marks)**

c. The 2cm diameter conductors of a 3-phase, 3-wire transmission line are situated at the corners of a triangle of sides 3.5m, 5m and 8m. Find the capacitance per conductor per km. If the line is transposed. **(05 Marks)**

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

b. Derive an expression for sending/end voltage and current for long transmission line using rigorous solution. **(08 Marks)**

c. A 3 phase, 50Hz transmission line, 100km long, delivers 20MW at 0.9 power factor lagging and at 110KV. The resistance and reactance of the line per phase per km are 0.2Ω and 0.4Ω respectively. While the capacitive admittance is 2.5×10^{-6} mho per phase per km. Calculate :
i) Voltage and current at the sending end
ii) Efficiency of the Transmission Line. Use nominal T method. **(08 Marks)**

7 a. A two conductor distributor has a length of 700m and is loaded as shown in Fig.Q7(a), the distance being represented in meters. The ends A and B are maintained at 250V and 255V respectively. If the minimum potential allowable at Consumer's terminal is 245V. Calculate the diameter of the conductor used. Resistivity is 1.7 micro ohm-cm.

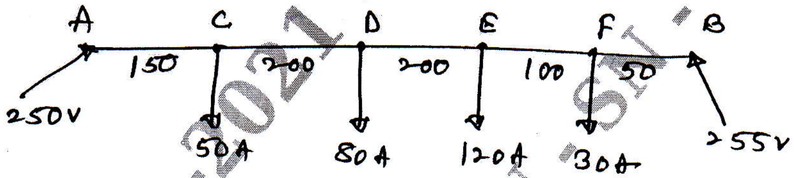

Fig.Q7(a) **(10 Marks)**

b. In a DC ring main shown in Fig.Q7(b). A voltage of 500V is maintained at A. At B a load of 150A is taken and at C a load of 200A is taken. Find the voltages at B and C. The resistance of each conductor of the main is 0.03Ω per 1000 meters.

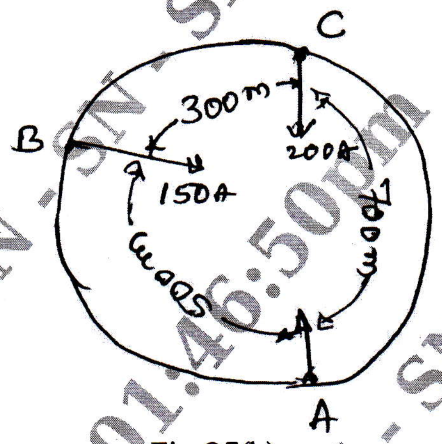

Fig.Q7(b) **(10 Marks)**

8 Write short notes on the following :

a. Pin type insulator
b. Transportation of transmission line
c. Testing of cables
d. Short transmission line. **(20 Marks)**

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