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10EE53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Transmission and Distribution

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are the advantages of power transmission at high voltages? **(05 Marks)**

b. Justify that the increase in transmission voltage causes:
i) Reduction in copper loss
ii) Reduction in volume of copper conductor. **(08 Marks)**

c. Explain a typical layout of power system scheme, with the help of single line diagram. **(07 Marks)**

2 a. Explain the effect of ice loading and wind loading on the sag of a line conductor. **(08 Marks)**

b. A transmission line conductor crossing a river is supported from two towers at heights of 30 m and 75 m above water level. The horizontal distance between the two towers is 275 m. If the tension in the conductor is 1600 kg and both the towers are on the same side of the point of maximum sag of parabolic configuration. Find the clearance between the water level and conductor at the midpoint between the towers. The weight of the conductor is 0.7 kg/m. Also find the span allowable for the same maximum sag, if the supports are the same level. **(12 Marks)**

3 a. Define string efficiency as applied to suspension insulators. Explain the different methods of improving string efficiency. **(10 Marks)**

b. A string insulator for 66 KV has 4 discs. The capacitance from each point to tower is 25% of the self capacitance of each unit. Find the voltage distribution across each unit and string efficiency. **(10 Marks)**

4 a. Discuss the advantages and disadvantages of CORONA. **(06 Marks)**

b. Obtain an expression for capacitance of a single core cable. Also show that $g_{max}/g_{min} = R/r$, where g_{max} = maximum dielectric stress, g_{min} = minimum dielectric stress, R = radius of sheath, r = radius of the conductor. **(08 Marks)**

c. Calculate the insulation resistance for a 5 km long cable. Resistivity of the insulation (impregnated paper) is 5×10^{14} Ω-cm, insulation thickness is 1 cm, and radius of the conductor is 1.25 cm. Derive the formula used. **(06 Marks)**

PART – B

5 a. Obtain an expression for inductance of a:
i) Single-phase (2-wire) line ii) Symmetrically spaced 3-ϕ line **(08 Marks)**

b. Find the inductance per phase of a three-phase bundled conductor line with two conductors per phase, as shown in Fig.Q5(b). Assume the radius of each conductor as 1.725 cm.

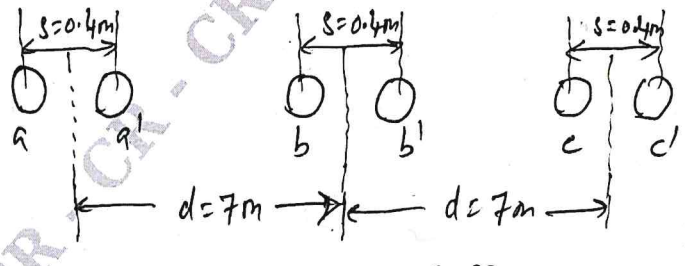

Fig.Q5(b) **(08 Marks)**

c. Explain the concept of GMD (Geometric Mean Distance) for calculation of inductance and capacitance of a transmission line. **(04 Marks)**

6 a. Obtain an expression of capacitance of a 3-ϕ system, symmetrically spaced conductors. **(08 Marks)**

b. Derive an expression for sending end voltage and current in terms of receiving end voltage and current; for a long transmission line. **(08 Marks)**

c. Explain Ferranti effect in long transmission lines. **(04 Marks)**

7 a. Explain Radial and Ring main distribution systems. **(08 Marks)**

b. A dc Ring main A, B, C, D, A is fed from point A at 250 V supply and the resistance (including both go and return) of various sections are given below:
AB = 0.02 Ω, BC = 0.018 Ω, CD = 0.025 Ω and DA = 0.02 Ω. The main supplies a load of 150A at B, 300 A at C, and 250 A at D. Find the voltage at each load point. **(12 Marks)**

8 Write notes on:

a. Requirements of a good distribution system

b. Capacitance grading method of cables

c. Calculation of sag at unequal supports **(20 Marks)**

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