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17EE43

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

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

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.

Module-1

1 a. Draw a line diagram of a typical power scheme indicating the standard voltages used at different levels. Explain: i) Feeders ii) Distributors iii) Service mains. **(10 Marks)**

b. A transmission line conductor at a river crossing is supported from two towers at heights of 50 and 80 meters above water levels. The horizontal distance between the towers is 300 metres. If the tension in the conductor is 2000kg, find the clearance between the conductor and water at a point midway between the towers. Weight of conductor per metre is 0.844kg. **(10 Marks)**

OR

2 a. What are the advantages of high voltage AC transmission line? **(05 Marks)**

b. Derive an expression for string efficiency of a 3 disc string. **(05 Marks)**

c. Write short notes on:
i) Vibrations of conductors
ii) Effect of wind and Ice on transmission line. **(10 Marks)**

Module-2

3 a. Explain the concept of self GMD and mutual GMD. **(04 Marks)**

b. Derive an expression for the inductance of a single phase two wire line. **(06 Marks)**

c. The below Fig.Q.3(c) shows the spacing of a double limit 3-phase overhead lines. The conductor radius is 1.3cm and line is transposed. Find the inductance per phase per kilometer. **(10 Marks)**

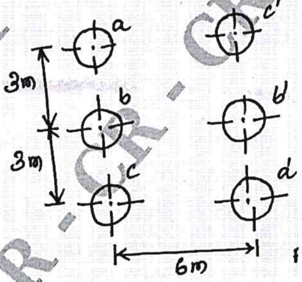

Fig.Q.3(c)

OR

4 a. Derive an expression for the line to neutral capacitance for a 3-phase overhead transmission line when the conductors are unsymmetrically spaced. **(10 Marks)**

b. Derive an expression for the inductance of a conductor due to internal and external flux. **(10 Marks)**

Module-3

5 a. Derive an expression for ABCD constants of a medium transmission line using nomial T-method. Also prove that line is symmetrical and reciprocal. **(10 Marks)**

b. A 3-ϕ short transmission line delivers 5000kW at 22kV and at a pf of 0.8 lagging to a load. Determine: i) Sending end voltage ii) % regulation iii) Transmission efficiency. The resistance and reactance of each conductor is 4Ω and 6Ω respectively. **(10 Marks)**

OR

6 a. Explain Ferranti effect. **(06 Marks)**

b. A 3-ϕ, 50Hz, 150km transmission line has the following constants.
Resistance/phase/km = 0.1Ω
Reactance/phase/km = 0.5Ω
Capacitance shunt admittance/phase/ km = 3×10^{-6} mho
If the line supplies a load of 50MW at 0.8pf lagging at 110KV at the receiving end, calculate by using nomial π-method. i) Sending end current ii) Sending end voltage iii) Sending end power factor. **(14 Marks)**

Module-4

7 a. Explain the phenomenon of corona in overhead transmission line. Also discuss the factors affecting the corona. **(10 Marks)**

b. Derive an expression for critical disruptive voltage and visual critical voltage reference to corona. **(05 Marks)**

c. A 3-ϕ line has conductors of 2cm in diameter, spaced equilaterally 1m apart. If the dielectric strength of air is 30KV/cm (max), find the critical disruptive voltage for the line. Air density factor δ = 0.952 and irregularity factor m_0 = 0.9. **(05 Marks)**

OR

8 a. What are the methods of grading of cables? Explain capacitance grading of cables. **(10 Marks)**

b. Discuss the different types of cables based on the voltage level. **(10 Marks)**

Module-5

9 a. Briefly explain the radial and ring main distributors. **(08 Marks)**

b. Draw the schematic diagram and hence obtain the expressions for voltages at different tappings of a DC distributor fed at one end with concentrated loads. **(12 Marks)**

OR

10 a. What is the power quality? What are the different power quality problems? **(05 Marks)**

b. What are the requirements of good distribution system? **(05 Marks)**

c. A 2 wire distributor AB is fed at A and supplied six concentrated loads each of 50A at C, D, E, F, G and H as shown in Fig.Q.10(c). What must be the resistance of each section so that maximum voltage drop for any consumer does not exceed 7V. Also calculate the total power loss with this resistance. Assume that the loads are spaced at equal distances. **(10 Marks)**

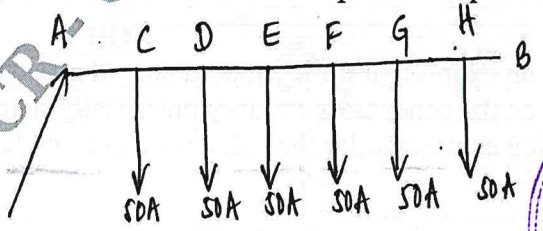

Fig.Q.10(c)

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