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18EE43

Fourth Semester B.E. Degree Examination, July/August 2021 Transmission and Distribution

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1
 - a. Enumerate the advantages of UHVAC over HVAC transmission. (05 Marks)
 - b. Derive the expression for sag when the supports are placed on same level. Also explain the effect of ice and wind on the sag. (07 Marks)
 - c. An overhead transmission line is supported by a string of 3 insulators which has self capacitance of 'C' farads and shunt capacitance of 0.2 farads. Estimate the string efficiency, If a guard ring is introduced, the capacitance between line and pin is 0.1C, find the new string efficiency considering the line to pin capacitance. (08 Marks)

- 2
 - a. Enumerate the limitations of EHVAC transmission. (05 Marks)
 - b. Explain :
 - i) Super thermal resistance aluminium alloy (ZTAI)
 - ii) Gap type super thermal resistance aluminum alloy conductor steel reinforced (GZTACSR) (06 Marks)
 - c. An overhead line at a river crossing is supported from two towers of height 50m and 85m above water level, the horizontal distance between the towers being 450m. If the maximum tension is 3980kg and the conductor weighs 1.726 kg/m find :
 - i) minimum clearance
 - ii) The clearance between the conductor and the water level at point, midway between the towers. (09 Marks)

- 3
 - a. Explain the effect of inductance in a transmission line with unsymmetrical spacing of conductor and derive an expression for inductance of a 3-phase transposed line. (10 Marks)
 - b. A 3-phase double circuit line is shown in Fig Q3(b). Find the capacitance per phase to neutral, Diameter of each conductor is 2cm.

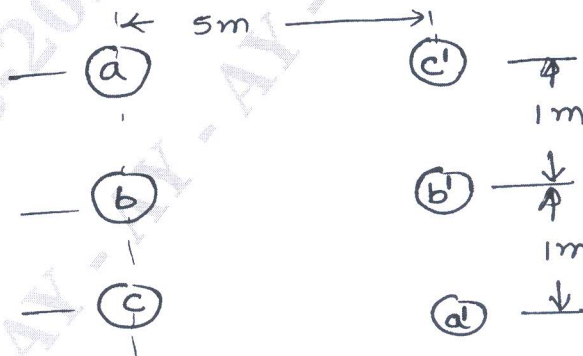


Fig Q3(b)

(10 Marks)

- 4
 - a. Derive an expression for capacitance of a 1-phase overhead transmission line. (10 Marks)
 - b. Find the inductance per phase per km length of the system of conductor shown in Fig Q4(b). Self GMD of conductor is 0.8cm. The line is transposed

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.

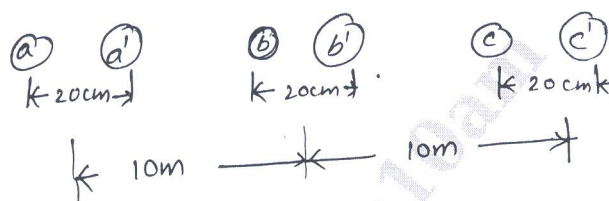


Fig Q4(b)

(10 Marks)

- 5 a. Derive an expression for A, B, C, D constants of a medium transmission line by using Nominal – T method and show that $AD - BC = 1$. (08 Marks)
- b. A 3-phase transmission line 100km is delivering 20mW at 66kV and 0.9pf lagging. The line has following parameters
- | | | |
|-------------------------------|---|----------------|
| Resistance/ph.km | = | 0.1Ω |
| Inductive reactance /Ph/km | = | 0.5 Ω |
| Capacitive susceptance /ph/km | = | 10^{-5} mhos |
- Determine sending end current, sending end voltage, sending end power factor, efficiency and regulation using Nominal – π method. (12 Marks)
- 6 a. Derive an expression for generalized A, B, C, D constants of a long transmission line by rigorous method of analysis. (10 Marks)
- b. A balanced 3-phase load of 30mW is supplied at 132kV, 50Hz, 0.8pf lagging by means of transmission line. The series impedance of each phase is $(20 + j50)\Omega$ and the total phase to neutral admittance is 310×10^{-6} mhos. Using nominal – T method, determine :
- ABCD constants
 - Sending end voltage and sending end current
 - % Regulation of line.
- (10 Marks)
- 7 a. Derive the expression for maximum and minimum stress in a single core cable. (06 Marks)
- b. What are the methods of grading of cables? Explain inters sheath grading of cable. (07 Marks)
- c. A certain 3-phase equilateral transmission line has a total corona loss of 53kW at 106kV and a loss of 98kW at 110.9kV. What is the disruptive critical voltage between lines? What is the corona loss at 113kV? (07 Marks)
- 8 a. What are the disadvantages of corona and explain the methods to reduce corona? (07 Marks)
- b. Find the disruptive critical and visual corona voltage of 3-ph 132kV line. Conductor diameter = 1.9cm, conductor spacing = 3.81m, temperature = 44°C, barometric pressure = 73.7cm, conductor surface factor fine weather = 0.8, rough weather = 0.66. (06 Marks)
- c. A single core lead sheathed cable is graded by using three dielectric of reactive permittivity 5, 4 and 3 respectively. The conductor diameter is 2cm and overall diameter is 8cm. If the three dielectrics are worked at the same maximum stress of 40kV/cm, find the safe working voltage of the cable. (07 Marks)
- 9 a. Explain the classification of AC distribution system. (07 Marks)
- b. Briefly explain the limitations of Distribution power system. (07 Marks)
- c. Non inductive loads of 10kW, 8kW and 5kW are connected between the neutral and R, Y, B respectively of a 3-phase, 4 wire system with line voltage of 400V. Calculate the current in each line and current in neutral. (06 Marks)
- 10 a. Explain various factors that cause Neutral floating. (06 Marks)
- b. Write a short notes on Reliability Aids. (06 Marks)
- c. A single phase ring distributor ABC is fed at A. The loads at B and C are 20A at 0.8pf lag and 15A at 0.6pf lag respectively. The total impedance of three sections AB, BC and CA are $(1+j1)$, $(1+j2)$ and $(1+j3)$ ohms respectively. Find the current fed at A and the current in each section. Use Thevenin's Theorem thermo to obtain the results. (08 Marks)