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Total Number of Pages: 2

B.Tech
PCEE4301

6th Semester Regular / Back Examination 2015-16
TRANSMISSION AND DISTRIBUTION SYSTEM

BRANCH: EE

Time: 3 Hours

Max Marks: 70

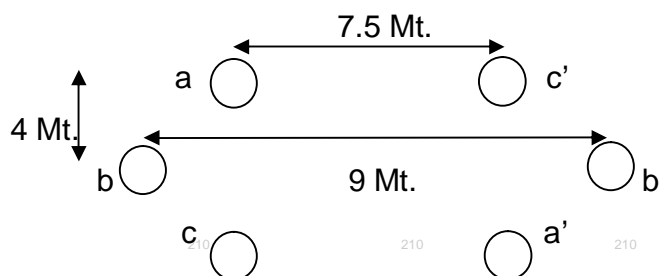
Q.CODE: W344

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: **(2 x 10)**

- Brief the concept of GMD and GMR in calculating inductance of a transmission line.
- What are the advantages of using a bundled conductor?
- Determine the wavelength of a 60 Hz signal in a Transmission line.
- What do you understand by "Surge Impedance loading" of a Line?
- What do you understand by propagation constant of a transmission line? Write down the units of α , β and γ .
- Point out the advantages and disadvantages of HVDC transmission system.
- What is a strain insulator and where it is used? Draw a neat sketch to show its location in a transmission line.
- What is kelvin's law? What are its limitations?
- Whether a single core underground cable having conductor radius 0.5 cm and outside radius 2 cm will work satisfactorily? Justify.
- What are the major equipments installed in a substation? What do you mean by PLCC?

Q2 a) Determine the capacitance and the charging current per KM when the transmission line as shown below operates at 220 kV. Assume the line is transposed and radius of each conductor is 1.25 cm. **(5)**



- b) An overhead line has conductor of 1.95 cm diameter and span of 244 meter. The allowable tension is 3.56×10^4 N. Find Vertical sag when there is an ice coating of 0.96 cm thickness and a horizontal wind pressure of 382 Newton/ square meter of projected area. Ice weight = 8920 N/mt³. Assume conductor weight is 0.847 kg/mt. (5)
- Q3** a) Derive ABCD parameters for a long transmission line. (5)
 b) Determine the efficiency and regulation of a three phase, 100 km, 50 Hz transmission line delivering 20 MW at a power factor of 0.8 (lagging) and 66 kV to a balanced load. The conductors are having resistance of 0.1 ohm/km, inductance of 11.67×10^{-7} H/Mt and capacitance of 9.96×10^{-12} F/mt. (Assume Nominal T Configuration) (5)
- Q4** From fundamental derive the expression for inductance of a composite conductor. And hence obtain the expression for inductance for a single phase transmission line consisting of group of conductors. (10)
- Q5** a) What is string efficiency? What are the methods employed to improve string efficiency? (5)
 b) An insulator string for 66 kV line has 4 discs. The shunt capacitance between each joint and metal work is 10% of the capacitance of each disc. Find the voltage across different discs and string efficiency. (5)
- Q6** a) Compare various distribution systems in terms of amount of conductor material used. (5)
 b) A two wire DC distributor AB, 600 Mt long is fed from both ends at 220 volt. Loads of 20 Amp, 40 Amp, 50Amp, 30 Amp are tapped at distances of 100 Mt, 250 Mt, 400Mt and 500 Mt from the end "A". If the area of cross-section of distributor conductor is 1 cm², find the minimum consumer voltage. Assume $\rho = 1.7 \times 10^{-6}$ ohm-cm (5)
- Q7** a) Why Grading of Cable is necessary? With neat sketch explain capacitance grading of cable. (5)
 b) A 33 kV 3 phase underground cable, 3 km long, uses three single core cable. Each cable has a conductor diameter of 1.5 cm and radial thickness of insulation is 0.5 cm. the relative permittivity of dielectric is 3.1. Find the capacitance and charging current/phase. Also find the dielectric loss/phase if power factor of unloaded cable is 0.03. (5)
- Q8** Write short notes on any two: (5 x 2)
 a) Tolerable Step voltage and Touch voltage
 b) Effect of earth on capacitance of a three phase transmission line
 c) Recent Trends in HVDC transmission
 d) Failure of Insulators