Exam.Code:0934
Sub. Code: 6662

2014

B.E. (Electrical and Electronics Engineering)

Fourth Semester

PC-EE-402: Power System - I

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: ***Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part. Assume any missing data.***

x-x-x

1. (a) Write factors that are to be considered while preparing impedance diagram.
   (b) What are composite conductors?
   (c) Explain difference between self GMD and mutual GMD of transmission lines.
   (d) Explain regulation and efficiency of transmission lines.
   (e) Explain ACSR conductors.

(5 * 2)

PART-A

2. (a) Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 kV, calculate the line to neutral voltage. Assume that shunt capacitance between each insulator and earth is 1/8 th of the capacitance of the insulator itself. Also find string efficiency.

   (b) Explain effect of vibrations on transmission lines. How these can be prevented?

(5, 5)

3. (a) Derive expression for most economical size of conductor in underground cable.

   (b) A 66 kV, 3-phase, 1-core lead sheathed cable has a conductor of 2 cm diameter and two layers of different materials each 1 cm thick. The relative permittivities are 5 (inner) and 3 (outer). Calculate maximum stress in the two dielectrics.

(3, 7)

P.T.O.

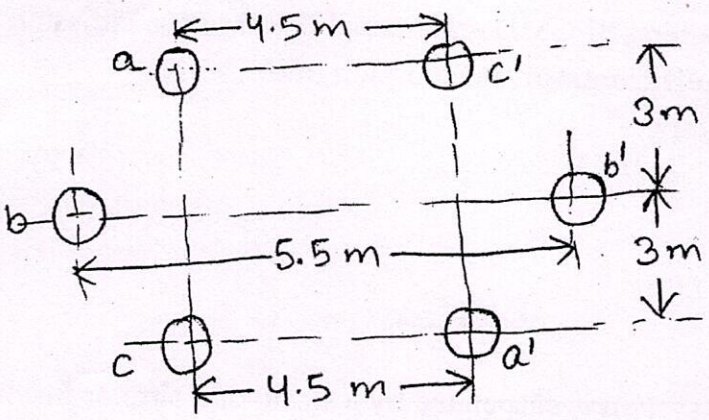
4. (a) What is characteristic impedance? Evaluate characteristic impedance for 1-core cable.

   (b) Explain reflection of travelling waves. Derive formula for reflection coefficient.

   (5, 5)

PART-B

5. (a) Find the inductance per phase per km of a double-circuit, 3-phase line as shown in figure. The conductors are transposed and are of radius 0.8 cm each.



   (b) Derive formula for capacitance of 3-phase overhead transmission line for symmetrical spacing.

   (8, 2)

6. A 3-phase, 100 km, 50 Hz transmission line has following constants:
   Resistance/ km = 0.3 Ω, Reactance/ km = 1.0 Ω, Susceptance/ km = $6*10^{-6}$ mho.
   The line voltage at receiving end is 132 kV. The transmission line is delivering 50 MVA at 0.85 p.f. lagging at receiving end. Calculate: Sending end line voltage, Sending end current, Sending end power factor, transmission efficiency, percentage regulation.
   Use Nominal-T method.

   (10)

7. Determine the inductor per phase per km of a double-circuit 3-phase line. The radius of each conductor is 2 cm and the conductors are placed on the circumference of an imaginary circle of radius 7 m forming a regular hexagon figure. (10)

x-x-x