(3 hours)   Marks : 80

Note : 1) 1. Question No.1 is Compulsory.
       2) Attempt **any 3** questions from remaining five questions
       3) Figures to the right indicate full marks.
       4) Make suitable assumptions wherever necessary

1. Attempt **any four**   20
   a) What are bundled conductors? Discuss the advantages when used in overhead line.
   b) Explain transmission line possesses R, L, C and G.
   c) Explain clearly the Ferranti effect with phasor diagram.
   d) Explain transposition of power system
   e) Define Per Unit System .Write Advantages of it.

2. a) Explain skin effect.   20
   b) Explain sag and its factors for the overhead line.
   c) A 50 Hz transmission line 300km long has a total series impedance of 40+j125 ohms & a total shunt admittance of 10^{-3}mho. The receiving end load is 50MW at 220KV with 0.8 lag power factor Find the sending end voltage, current and power using
          i) Short line approximation.
          ii) Nominal pi method.

3. a) Derive an expression for Inductance of three phase line with unsymmetrical   20
      spacing.
   b) A 400KV 3 phase bundled conductor line with two sub conductors per phase has a horizontal configuration as shown in the diagram given below. The radius of each sub conductor is 1.6cm. (i) Find the inductance per phase per km of the line. (ii) Compute the inductance of the line with only one conductor per phase having the same cross sectional area of the conductor of each phase.
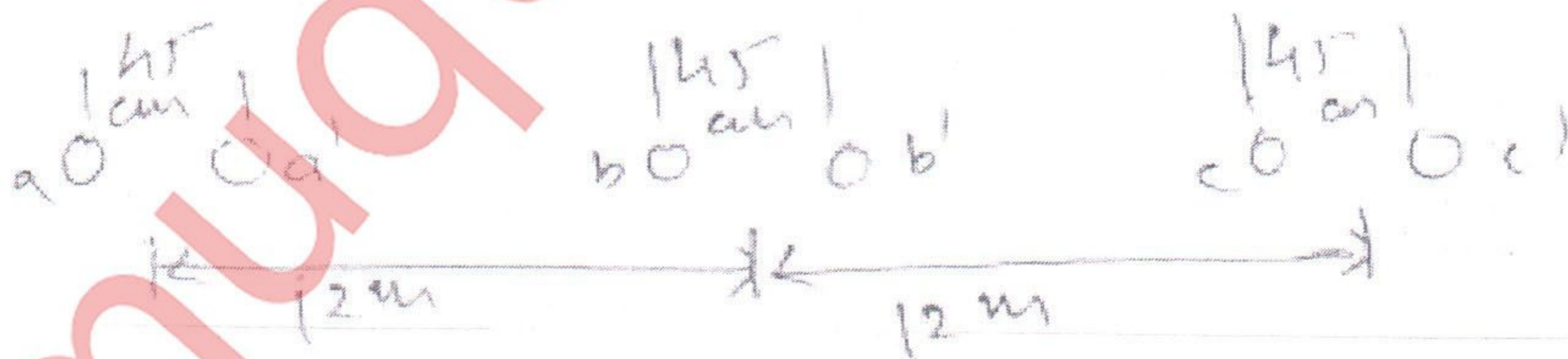
[TURN OVER]

4. a) Each line of a three phase system is suspended by a string of 3 similar   20
insulators. If the voltage across the line unit is 18 KV. Calculate the line to
neutral voltage. Assume that the shunt capacitance between each insulator
and earth is 1/9th of the capacitance of the insulator itself. Also find string
efficiency.

   b) A transmission line conductor has an effective diameter of 2cm and weights
0.9kg/m. The UTS (ultimate tensile strength) is 9000kg. The distance between
two adjacent supports is 300m.If the conductor has ice coating of radial
thickness is 1.27cm and subjected to a wind pressure of 3.6gm/cm² of projected
area. Calculate the sag if weight of IC.C of ice is 0.91gm and factor of safety
is 2.

5. (a) Describe different methods to improve string efficiency.   20
   (b) A string insulator has five units each rated for 11kV. Find the maximum line
voltage on which it can be operated safely. The mutual capacitance of unit is
10times the capacitance between pin to earth.

6. Write notes: 20
   a) Explain tuned power line
   b) Describe grading of cables.
   c) Explain measurement of earth resistance and soil resistivity

----