[5461] - 580

B.E. (Electrical)

EHV AC TRANSMISSION

(2015 Pattern) (End Sem.) (403144C) (Semester-I) (Elective-II)

*Time : 2 ½ Hours]*   *[Max. Marks :70*

Instructions of the candidates:

1) *Answer all questions.*
2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7, or Q8.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Assume suitable data, if necessary.*
6) *Use of calculator is allowed.*

Q1) a) Prove that the percentage power loss in transmission line is independent of line length. **[4]**

b) The dimensions of a 3-phase 400-kV horizontal line as shown in fig. are: H = 15 m, S = 11 m phase separation, conductor 2x 3.18 cm diameter, and B = 45.72 cm. Calculate: the matrix of inductances per km, for un transposed configuration. **[8]**
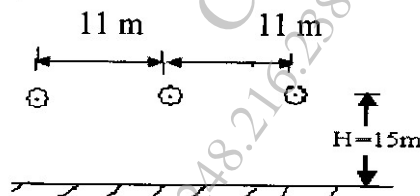
c) Explain Field of sphere gap and also derive equation as $S_1 S_2 = R^2$. **[8]**

OR

Q2) a) Write a note mechanical considerations in line performance. **[8]**

b) Derive expression for inductance of multi conductor lines & state Maxwell's coefficients **[8]**

c) Explain the field of a point charge and its properties. Derive the equation for the electrostatic field of a point charge. **[4]**

P.T.O.

Q3) a) Evaluate the horizontal, vertical and total value of electrostatic field components near the single circuit transmission line, which are energized by three phase voltages. **[10]**

b) Derive expression for electrostatic induction on un energized circuit of double circuit line. **[8]**

OR

Q4) a) Derive the expression for electrostatic field of Double circuit 3 phase A.C line **[10]**

b) Discuss effect of high electrostatic field on: **[8]**
   i) Humans
   ii) Animals
   iii) Plants

Q5) a) With a simple block diagram, explain the Audible noise measuring circuit in Extra high voltage ac lines. **[8]**

b) State and explain at least 4 formulae for power loss due to corona. **[8]**

OR

Q6) a) Explain formation of corona & define terms **[8]**
   i) Corona inception voltage.
   ii) Visual corona voltage.

b) Draw a charge - voltage diagram and derive an expression $P_c = \frac{1}{2} KC$ $(V_m^2 - V_0^2)$ for corona loss. **[8]**

Q7) a) State and explain at least four factors to be considered in the design of ehv lines based upon the steady state limits. Also state their limiting value. **[8]**

b) Name the materials used for insulation in E.H.V cables; and state the properties of SF_6 gas as an insulating in cables. **[8]**

OR

Q8) a) Define tan δ loss factor & derive an expression for insulation resistance of a cable. **[8]**

b) Write note on various properties of XLPE used in EHV cables. **[8]**

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