

Total No. of Questions : 08]

SEAT No. :

P3322

[Total No. of Pages :2]

[5461] - 580

B.E. (Electrical)

EHV AC TRANSMISSION

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

Time : 2 ½ Hours]

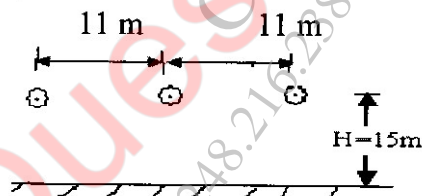
[Max. Marks :70

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  $2 \times 3.18$  cm diameter, and  $B = 45.72$  cm. Calculate: the matrix of inductances per km, for untransposed 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 an 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:

- 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<sub>6</sub> 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]