

Total No. of Questions : 8]

SEAT No. :

P3142

[Total No. of Pages : 2

[5354]-630

B.E. (Electrical)

EHV AC TRANSMISSION

(2012 Pattern) (Semester - I) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume Suitable data if required.
- 5) Use of calculator is allowed.

- Q1)** a) The field strength on the surface of a sphere of 4 cm diameter is equal to the corona inception gradient in air of 30 kv/cm. Find the charge on sphere. [4]
- b) A power of 2,000 MW is to be transmitted over a distance of 1600 km. The alternative used is 3 phase 400 kV and 1000 kV AC line. Suggest the number of circuits required, currents transmitted and the total line losses. Assume r and x of conductor as 0.0136 ohm/km & 0.272 ohm/km for 400 kV line and 0.0036 ohm/km and 0.231 ohm/km for 1000 kV line respectively. [8]
- c) Derive expression for inductance of multi conductor lines and state Maxwell's coefficients. [8]

OR

- Q2)** a) Calculate Geometric Mean Radius (GMR) of a bundled conductor for 750 KV AC line having 4 sub conductors each of 3.46 cm diameter and sub conductor spacing 45 cm. [6]
- b) Explain the field of a point charge and its properties. Derive the equation for the electrostatic field of a point charge. [7]
- c) Explain different types of vibrations of transmission conductors in brief. [7]

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. [9]
- b) Discuss the effects of high electrostatic field on : [9]
- i) Humans
 - ii) Animals
 - iii) Plants

OR

- Q4)** a) Explain the terms in detail : [9]
- i) Primary shock current
 - ii) Secondary shock current
 - iii) let-go currents
- b) Derive the expression for electrostatic induction on unenergized circuit of double circuit line. [9]

- Q5)** a) Write a note on 'Measurement of Audible Noise' produced by corona. [8]
- b) Draw a charge-voltage diagram and derive an expression $P_c = 1/2 KC (V_m^2 - V_0^2)$ for corona loss. [8]

OR

- Q6)** a) Discuss visual corona under standard operating condition and conditions other than standard operating condition. [8]
- b) Explain the quantities on which the audible noise depends for the EHV AC lines. [8]

- Q7)** a) Brief, the line insulation design based upon transient over voltages. [8]
- b) Explain detail classification of cables and mention typical insulation thickness for EHV cables. [8]

OR

- Q8)** a) State the design factors considered under steady state condition of transmission line. Also state their limits for satisfactory performance. [8]
- b) Define $\tan \delta$ loss factor and derive an expression for insulation resistance of a cable. [8]

