Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) What is the necessity of EHV AC Transmission? [2]
 b) Derive the expression for equivalent radius of a bundle conductor. [3]
 c) Write the charge potential relation of a multi conductor line. [2]
 d) Derive the cosine law of variation of 'E' with 'θ'. [3]
 e) What is Corona? [2]
 f) Draw Bode frequency plot of positive and negative corona pulses. [3]
 g) Write short notes on travelling waves in EHV.A.C lines. [2]
 h) An overhead line with $Z_0=500$ ohms continues into a cable with $Z_c=200$ ohms. A surge with a crest value of 2000 kV is coming towards the junction from the overhead line. Calculate the voltage in the cable. [3]
 i) Write short notes on Static Reactive compensating system. [2]
 j) Draw the diagram showing extra long line with shunt reactors at ends and at an intermediate station. [3]

PART - B

(50 Marks)

2. The dimensions of the 3-phase, 400 kV horizontal line shown in the figure are H= 15 m, S = 11 m phase separation, Conductor is 2×3.18 cm diameter, Bundle spacing B=45.72 cm. Calculate the matrix of inductance per km for transposed and un transposed lines. [10]

OR
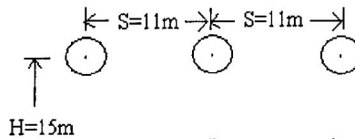
3. Write down the procedure for diagonalization of Inductance matrix L= $\begin{bmatrix} L_S & L_m & L_m \\ L_m & L_S & L_m \\ L_m & L_m & L_S \end{bmatrix}$ of a transposed line. [10]

4. Derive the expression for voltage (charge voltage relation) of two conductor line. [10]

OR

5. Starting from the fundamentals derive the expression for potential relations for multi conductor lines. [10]

6.a) Explain in detail generation characteristics and limits of AN.
   b) Discuss the Corona loss formulae. [5+5]

OR

7.a) Explain in detail the measurement of Audible Noise.
   b) Explain the corona pulses, their generation and properties. [5+5]

8. Derive the expression for total electrostatic field component of a 3-phase, single circuit AC line. [10]

OR

9. Derive the expressions for induced voltages in the un energized line when only one circuit is energized in the double circuit line. [10]

10.a) Explain cascade connection of components in shunt and series compensation.
    b) Explain the power circle diagram and its use in voltage control. [5+5]

OR

11.a) Explain the voltage control using synchronous condenser.
    b) Explain the sub synchronous resonance in a series capacitor. [5+5]

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