

**R13**

Code No: 118BH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech IV Year II Semester Examinations, May - 2019****EHV AC TRANSMISSION****(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

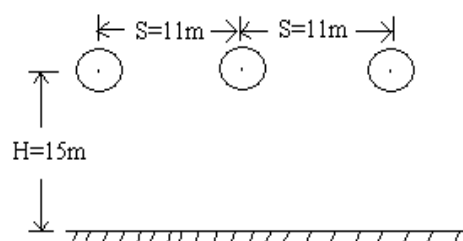
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**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  $2 \times 3.18$  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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