R15

Code No: 128BH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year II Semester Examinations, July - 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 need for EHV A.C Transmission? [2]
b) State the advantages of bundled conductors. [3]
c) State the laws of electrostatics. [2]
d) Explain the field of line charges and their properties. [3]
e) The AN level of one phase of a 3-phase transmission line at a point is 50 dB. Calculate SPL in Pascal. [2]
f) Obtain the relation between 1-phase and 3-phase AN levels. [3]
g) Write the expression for travelling voltage wave form. [2]
h) What is electromagnetic interference? [3]
i) What is the need for voltage control in EHV ac lines? [2]
j) What is the use of power circle diagram? [3]

PART - B

(50 Marks)

2.a) Derive the expression for Inductance of Two- conductor line used in EHV A.C Transmission.
b) Write short note on sequence inductances of EHV AC lines. [6+4]

OR

3.a) Derive the expression for capacitance of Two-conductor line used in EHV A.C Transmission.
b) A 3-phase, 500 kV horizontal line has minimum height of 13 m, sag at mid span=13m. Phase spacing S=16 m. Conductors are 4 × 0.035m with bundle spacing of B=0.4572m. Calculate the matrix of Maxwell's Potential coefficients for an untransposed configuration per kilometer. For calculation take $H_{av} = H_{min} + sag/3$. [5+5]

4. Explain the procedure of calculating the maximum surface voltage gradients on the centre and outer Phases of Horizontal configuration of EHV AC line for $N \geq 3$ conductors. [10]

OR

5. For a 400kV line, calculate the maximum surface voltage gradients on the centre and outer phases in horizontal configuration at the maximum operating voltage of 420kV, r.m.s line to line. The other dimensions are: H=14m, S=12m, N=2, r=0.016m, B=0.48m. [10]

6. Explain the mechanism of formation of positive corona pulse train. [10]

OR

7. Derive an expression $P_c = 4f\ k\ c\ V\ (V\text{-}V_0)$ to calculate the corona loss in EHV A.C lines. [10]

8. Explain the effect of high electrostatic field on biological organisms and human beings. [10]

OR

9. A transmission line is 300 km long and opens at the far end. The attenuation of surge is 0.85 over one length of travel at light velocity. It is energized by (a) a step of 1000kV, and (b) a sine wave of 325 kV peak when the wave is passing through its peak. Calculate and plot the open end voltage up to 20 milli seconds. [10]

10. Explain the shunt and series compensation techniques used in voltage control in EHV AC Lines. [10]

OR

11. State and explain the different advantages obtained by using static VAR compensation. [10]

---ooOoo---