

M.TECH FIRST SEMESTER

EEPC1T5B

**EHVAC TRANSMISSION
(ELECTIVE-I)**

Credits: 4

Lecture: 4 periods/week

Internal assessment: 30 marks
Semester end examination: 70 marks

Objective: This subject deals with the importance of EHVAC transmission

- Calculation of EHVAC line parameters and electro static fields
- Surface voltage gradient of EHV conductors
- Corona effect in EHV system
- Power frequency and voltage control

Learning outcomes:

1. Examine key advantages and applications of EHVAC system
2. Examine technical aspects in EHVAC line parameter calculations
3. Corona, frequency and voltage control in EHVAC system
4. Evaluate the value proposition for using EHVAC to carry 10w cost high capacity

Unit 1 : E.H.V. A.C. Transmission , line trends and preliminary aspects ,standard transmission voltages – power handling capacities and line losses – mechanical aspects.

Unit 2 : Calculation of line resistance and inductance : resistance of conductors, temperature rise of conductor and current carrying capacity. Properties of bundled conductors and geometric mean radius of bundle, inductance of two conductor lines and multi conductor lines, Maxwell's coefficient matrix.

Unit 3 : Line capacitance calculation : capacitance of two conductor line, and capacitance of multi conductor lines, potential coefficients for bundled conductor lines, sequence inductances and capacitances and diagonalization.

Unit 4 : Calculation of electro static field of AC lines - Effect of high electrostatic field on biological organisms and human beings.

Unit 5 : Surface voltage Gradient on conductors, surface gradient on two conductor bundle and cosine law, maximum surface voltage gradient of bundle with more than 3 sub conductors, Mangolt formula.

Unit 6 : Corona : Corona in EHV lines – corona loss formulae – attenuation of traveling waves due to corona – Audio noise due to corona, its generation, characteristics and limits, measurement of audio noise.

Unit 7 : Power Frequency voltage control : Problems at power frequency, generalized constants, No load voltage conditions and charging currents, voltage control using synchronous condenser, cascade connection of components : Shunt and series compensation, sub synchronous resonance in series – capacitor compensated lines

Unit 8 : Static reactive compensating systems : Introduction, SVC schemes, Harmonics injected into network by TCR, design of filters for suppressing harmonics injected into the system.

Reference Books :

1. Extra High Voltage AC Transmission Engineering – Rakosh Das Begamudre, Wiley Eastern Ltd., New Delhi – 1987.
2. EHV Transmission line reference book – Edision Electric Institute (GEC) 1986.