

**M.TECH FIRST SEMESTER  
EHVAC & HVDC TRANSMISSION**

**17EPCIT6B**

**Lecture: 4 periods/week**

**Credits: 4**

**Internal Assessment: 40 marks**

**End Semester Assessment: 60 marks**

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**Course Objective:**

To provide an in-depth understanding of the different aspects of Extra High Voltage A.C. and High Voltage D.C. Transmission system design and Analysis.

**Course learning Outcomes:** At the end of the course the student will be able to

1. To be able to acquaint with EHV transmission system with regard to electrostatic field. Further knowledge is gained in area of bundle conductor system.
2. To develop ability for determining corona, radio interference, audible noise generation.
3. To be able to acquire knowledge on power flow analysis on AC/ DC systems and MTDC systems.
4. To develop knowledge on Transient over voltages, converter faults and protection in HVDC system.

**UNIT-I:**

E.H.V.A.C. Transmission line trends and preliminary aspect standard transmission voltages – Estimation at line and ground parameters-Properties of Bundled Conductors-Inductance and Capacitance of E.H.V. lines – Sequence Inductances and Capacitances– Line Parameters for Modes of Propagation. Electrostatic field and voltage gradients – calculations of electrostatic field of AC lines – surface voltage gradients and maximum gradients of actual transmission lines – voltage gradients on sub conductor

**UNIT-II:**

Corona in E.H.V. lines – Corona loss formulae- attention of traveling waves due to Corona – Audio noise due to Corona, its generation, characteristic and limits. Measurements of audio noise radio interference due to Corona - properties of radio noise – frequency spectrum of RI fields – Measurements of RI and RIV. Design of EHV lines based on steady state and transient limits - EHV cables and their characteristics.

**UNIT-III:**

HVDC Transmission: power flow analysis in AC and DC systems –Multi-terminal dc (MTDC) links and system their operation and control, HVDC- transmission based on voltage source converters.

**UNIT-IV:**

Transient over voltages in HVDC systems: Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults. Converter faults and protection in HVDC Systems: Converter faults, over current protection - valve group, and DC line protection, circuit breakers. Over voltage protection of converters, surge arresters.

**TEXT BOOKS:**

1. Rakosh Das Begamudre, “Extra High Voltage AC Transmission Engineering” Revised Second Edition, John Wiley.
2. K.R. Padiyar, “HVDC Power Transmission System”, Second revised Edition, New Age Int. 2012
3. Arrillaga J “High Voltage Direct current Transmission” 2nd Edition (London) Peter Peregrinus, IEE, 1998.

**REFERENCE BOOKS:**

1. S. Rao, “EHV-AC and HVDC Transmission Engineering Practice”, Khanna Publishers.
2. Vijay K. Sood, “HVDC Transmission Power Conversion Applications in Power systems”, John Wiley & Sons (Asia) Pte Ltd.