

4/4 B.Tech. SEVENTH SEMESTER**EE7T2****HVDC TRANSMISSION****Credits: 3****Lecture: 3 periods/week****Internal assessment: 30 marks****Tutorial: 1 period /week****Semester end examination: 70 marks****Course Objective:**

This subject deals with the importance of HVDC transmission, analysis of HVDC converters, faults and protections, harmonics and filters.

Course Outcomes:

After completing this course, student is able to

1. Evaluate HVDC transmission, list out the various applications and recognize the technical planning issues of HVDC transmission systems.
2. Analyze converter configurations used in HVDC systems.
3. Understand controllers for controlling the power flow through a DC link.
4. Understand converter faults and protection in converter station and able to control reactive power in HVDC system.
5. Analyze the generation of harmonics and design of filters in HVDC systems.

UNIT I**HVDC Transmission**

Introduction, comparison of AC & DC transmission, application of DC transmission, description of DC transmission system, planning for HVDC transmission system, modern trends in DC transmission.

UNIT II**Analysis of HVDC Converters**

Pulse number, choice of converter configurations, analysis of Graetz circuit (6-pulse converter), voltage waveforms, converter bridge characteristics, characteristics of 12 Pulse converters, detailed analysis of converters.

UNIT III**Converter & HVDC System Control**

Principles of DC link control, converter control characteristics, system control hierarchy, firing angle control, current and extinction angle control, starting and stopping of a DC link, power control.

UNIT IV**Converter Faults & Protection**

Converter faults, protection against over currents, over voltages in a converter station, Protection against over voltages.

Reactive Power Control

Reactive power requirements in steady state, sources of reactive power.

UNIT V**Harmonics & Filters**

Generation of harmonics, characteristic harmonics & Non-Characteristic harmonics. Types of AC filters, design of single tuned filters, design of high pass filter, analysis of double tuned filter.

Learning Resources

Text Books:

1. HVDC Power Transmission Systems - K. R. Padiyar, New Age International Publishers, Third Edition.
2. Direct Current Transmission - E.W.Kimbark, Wiley-Interscience.

Reference Books:

1. EHV-AC, HVDC Transmission & Distribution Engineering - S. Rao, Khanna Publishers, Third Edition.
2. HVDC Transmission – J.Arrillaga, The Institution of Engineering & Technology.