

<b>COURSE</b>	Name : Transmission and High-Voltage Equipment
	Code : EE184613
	Credits : 3
	Semester : VI

### Description of Course

Transmission and High-Voltage Equipment courses explain about overall electrical transmission system along with transmission system equipment including substations. The transmission system course will be used to determine the performance of long, medium and short transmission systems. Meanwhile, the performance parameter is a voltage drop. Mechanical parameters in transmission systems such as sagging, tower types are also discussed in this course. High voltage equipment in transmission systems such as insulators, conductors, arresters are also discussed in detail.

### Learning Outcomes

#### KNOWLEDGE

(P02) Mastering the concepts, procedures and principles of engineering and realizing them in the form of procedures required for system analysis and design in electric power systems, regulatory systems, multimedia telecommunications, or electronics.

#### SPECIFIC SKILL

(KK01) Able to make formulation of engineering problems in electric power systems, regulatory systems, multimedia telecommunications, or electronics.

#### GENERAL SKILL

(KU12) Able to implement information and communication technology in the context of carrying out their work.

#### ATTITUDE

(S09) Demonstrate the attitude of being responsible for work in their area of expertise independently

(S12) Working together to make use of their maximum potential

### Course Learning Outcomes

#### KNOWLEDGE

- Mastering the concepts and principles of AC, DC transmission and underground transmission with all electrical power equipment attached to the transmission system.
- Mastering the working principle of high voltage equipment at a substation and the principles of substation design.

#### SPECIFIC SKILL

- Able to calculate transmission system quantities such as resistance, conductance and impedance, capacitance and apply to short, medium, and long transmission lines to calculate the performance of the transmission line.
- Able to explain the concept of HVDC transmission lines and Underground High Voltage line and be able to compare the performance of AC and DC line
- Able to explain and describe the substation layout and explain the working principles of

conventional substation equipment and SF<sub>6</sub> substation

#### GENERAL SKILL

Able to use ETAP or Power World or DigSilent software to assess the performance of a simple transmission system.

#### ATTITUDE

Showing an attitude of responsibility for work in his area of expertise independently

Working together to make use of their maximum potential.

#### Main Subjects

1. Function, Type of Transmission, and AC Transmission
2. Parameters: Resistance
3. Parameters: Inductance, GMR, GMD
4. Parameters: Capacitance
5. Channel Modeling: Short, Medium, Long
6. HVDC transmission system including the use of underground cables
7. Sag and Tension, Corona, Bundle Conductor, Transposition
8. Substation Type and Layout
9. Switchgear: Circuit Breaker, Disconnecting Switch, Measurement Transformer (CT & VT)
10. Power cables, insulators and bushings

#### Reference(s)

- [1] TuranGonen, "Electrical Power System Transmission Engineering: AnaysisdanDesain", CRC Press, Third Edition, 2014
- [2] J.J. Granger, W.D. Stevenson, "Power System Analysis", John Wiley, New York, 1994
- [3] –" ABB Swtichgear Manual", Cornelsen Verlag, Berlin, 10<sup>th</sup> revised edition, Berlin, 2004
- [4] John D. McDonald (Editor), "Electric Power Substations Engineering", CRC Press, Third Edition, 2012

#### Prerequisite(s)

EE184513 High Voltage Engineering

EE184511 Power System Analysis