

Mata Kuliah Course	Nama MK <i>Name</i>	: Transmisi dan Peralatan Tegangan Tinggi <i>: Transmission and High-Voltage Equipment</i>
	Kode MK <i>Code</i>	: EE184613
	Kredit <i>Credits</i>	: 3 sks
	Semester <i>Semester</i>	: VI (Wajib) <i>: VI (Compulsory)</i>
	Beban Belajar <i>Workload</i>	: Kuliah : 3 x 50 = 150 menit/minggu Latihan/tugas : 3 x 60 = 180 menit/minggu Belajar mandiri : 3 x 60 = 180 menit/minggu <i>: Lectures : 3 x 50 = 150 min/week</i> <i>Exercises/Assignments : 3 x 60 = 180 min/week</i> <i>Self learning : 3 x 60 = 180 min/week</i>
	Tingkatan <i>Module Level</i>	: Sarjana (S1) <i>: Undergraduate</i>
	Penanggung Jawab <i>PIC</i>	: Dr. Ardyono Priyadi, ST, M.Eng
	Pengajar <i>Lecturer</i>	: Dr. Ardyono Priyadi, ST, M.Eng Ir. Sjamsjul Anam, MT
	Bahasa <i>Language</i>	: Bahasa Indonesia dan Bahasa Inggris <i>: Bahasa Indonesia and English</i>
	Persyaratan dan Peraturan <i>Requirement and Regulation</i>	: Setiap mahasiswa harus menghadiri setidaknya 75% dari jumlah perkuliahan untuk dapat mengikuti ujian <i>: A student must have attended at least 75% of the lectures to sit in the exams</i>

Deskripsi Mata Kuliah

Description of Course

Mata kuliah Transmisi dan Peralatan Tegangan Tinggi membahas tentang sistem transmisi kelistrikan secara menyeluruh beserta peralatan sistem transmisi termasuk Gardu Induk. Sistem transmisi yang dipelajari secara umum akan dipergunakan untuk mengetahui unjuk kerja dari sistem transmisi panjang, menengah, dan pendek. Parameter unjuk kerja adalah drop tegangan. Parameter mekanis pada sistem transmisi seperti sagging, jenis tower juga dibahas pada mata kuliah ini. Peralatan tegangan tinggi pada sistem transmisi seperti isolator, konduktor, arrester juga dibahas dengan detail.

Transmission and High-Voltage Equipment courses explain the 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.

CPL Prodi yang Dibebankan

Learning Outcomes

(CPL-01) Mampu menerapkan ilmu pengetahuan alam dan matematika pada bidang teknik elektro

(PLO-1) Capable to apply knowledge of natural sciences and mathematics to solve electrical engineering problem

(CPL-05) Mampu mengidentifikasi, memformulasikan dan menyelesaikan permasalahan dibidang teknik elektro

(PLO-5) Capable to identify, formulate and solve problems in the field of electrical engineering

(CPL-11) Mampu menerapkan metode, ICT, dan perangkat modern dalam penyelesaian permasalahan dibidang teknik elektro

(PLO-11) Capable to apply methods, ICT, and modern devices in solving problems in the field of electrical engineering

Capaian Pembelajaran Mata Kuliah

Course Learning Outcomes

(CPMK-01) Menguasai konsep dan prinsip sistem transmisi AC , DC dan transmisi bawah tanah dengan segala peralatan tenaga listrik yang melekat pada sistem transmisi.

(CLO-01) Master the concepts and principles of AC, DC transmission and underground transmission with all electrical power equipment attached to the transmission system.

(CPMK-02) Menguasai prinsip kerja peralatan-peralatan tegangan tinggi pada sebuah gardu induk dan prinsip-prinsip desain gardu induk.

(CLO-02)

Master the working principle of high voltage equipment at a substation and the principles of substation design.

(CPMK-03) Mampu menghitung besaran-besaran sistem transmisi seperti resistansi, konduktansi dan impedansi, kapasitansi saluran dan menerapkan pada saluran transmisi pendek, menengah, panjang untuk menghitung unjuk kerja dari saluran transmisi.

(CLO-03) 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.

(CPMK-04) Mampu menjelaskan konsep saluran transmisi HVDC dan saluran Tegangan Tinggi Bawah Tanah dan mampu membandingkan unjuk kerja saluran AC dan DC.

(CLO-04) 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.

(CPMK-05) Mampu menjelaskan dan menggambarkan layout gardu induk serta menjelaskan prinsip kerja dari peralatan gardu induk konvensional maupun Gardu Induk SF₆.

(CLO-05) Able to explain and describe the substation layout and explain the working principles of conventional substation equipment and SF₆ substation.

(CPMK-06) Mampu menggunakan software ETAP atau Power World atau DigSilent untuk menilai unjuk kerja sistem transmisi sederhana.

(CLO-06) Able to use ETAP or Power World or DigSilent software to assess the performance of a simple transmission system.

(CPMK-07) Menunjukkan sikap bertanggungjawab atas pekerjaan di bidang keahliannya secara mandiri.

(CLO-07) *Showing an attitude of responsibility for work in his area of expertise independently.*

(CPMK-08) Bekerja sama untuk dapat memanfaatkan semaksimal mungkin potensi yang dimiliki.

(CLO-08) *Working together to make use of their maximum potential.*

Topik/Pokok Bahasan

Main Subjects

1. Fungsi, Jenis Transmisi, serta Transmisi AC
Function, Type of Transmission, and AC Transmission
2. Parameter Saluran: Resistansi
Parameters: Resistance
3. Parameter Saluran : Induktansi, GMR, GMD
Parameters: Inductance, GMR, GMD
4. Parameter Saluran : Kapasitansi
Parameters: Capacitance
5. Pemodelan Saluran : Pendek, Menengah, Panjang
Channel Modeling: Short, Medium, Long
6. Sistem transmisi HVDC termasuk penggunaan kabel bawah tanah
HVDC transmission system including the use of underground cables
7. Sag dan Tension, Korona, Bundle Conductor, Transposisi
Sag and Tension, Korona, Bundle Conductor, Transposition
8. Jenis dan Layout Gardu Induk
Substation Type and Layout
9. Switchgear : Circuit Breaker, Disconnecting Switch, Trafo Pengukuran (CT & VT)
Switchgear: Circuit Breaker, Disconnecting Switch, Measurement Transformer (CT & VT)
10. Kabel Daya, Isolator dan Bushing
Power cables, insulators and bushings

Pembelajaran dan ujian

Study and examination

- Latihan di kelas
In-class exercises
- Tugas 1, 2, 3
Assignment 1, 2, 3
- Ujian tengah semester
Mid-term examination
- Ujian akhir semester
Final examination

Pustaka

Prerequisite(s)

- [1] Turan Gonen, "Electrical Power System Transmission Engineering: Anaysis dan Desain", 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, 10th revised edition, Berlin, 2004
- [4] John D. McDonald (Editor), "Electric Power Substations Engineering", CRC Press, Third Edition, 2012

**Prasyarat*****Prerequisite(s)***

- EE184513 Teknik Tegangan Tinggi
EE184513 High Voltage Engineering
- EE184511 Analisis Sistem Tenaga Listrik
EE184511 Power System Analysis