



**INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)**  
**FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS**  
**DEPARTEMEN TEKNIK ELEKTRO**  
**Program Studi Sarjana (S1) Teknik Elektro**

**INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)**  
**FACULTY OF INTELLIGENT ELECTRICAL & INFORMATICS TECHNOLOGY**  
**DEPARTMENT OF ELECTRICAL ENGINEERING**  
**Bachelor Degree Program in Electrical Engineering**

<b>1</b>	<b>Nama Mata Kuliah / Course Name</b> : Pemeliharaan Peralatan Listrik / <i>Electrical Equipments Maintenance and Testing</i>
<b>2</b>	<b>Kode Mata Kuliah / Course Code</b> : EE234721
<b>3</b>	<b>Kredit / Credits</b> : 3 SKS
<b>4</b>	<b>Semester / Semester</b> : 0

#### **Deskripsi Mata Kuliah / Course Description**

Matakuliah Pemeliharaan Peralatan Listrik membahas tentang strategi dan manajemen pemeliharaan secara umum (Computerized Maintenance Management System /CMMS), test DC dan AC pada isolasi peralatan listrik. Selain bahasan tersebut, di kuliah ini juga dibahas pengujian dan pemeliharaan peralatan sistem tenaga listrik yang mencakup peralatan listrik di pembangkit, gardu induk, transmisi dan distribusi termasuk Generator, Cable, Trafo, Switchgear, Circuit breaker, dan Motor. Selain materi teoritis di atas, praktek pengujian peralatan dan analisisnya akan dilakukan di laboratorium, termasuk pengukuran resistansi, induktansi dan kapasitansi belitan, tahanan isolasi, Polarisasi Index, Dielectric Absorbption Ratio, tahanan kontak, tahanan pentanahan dan HiPot test. Prosedur keselamatan, urutan kerja dan dokumentasi laporan juga dibahas. Prosedur penulisan laporan FMEA dan RCA dikenalkan dan dibuat latihan dalam penugasan / *The Electrical Equipment Maintenance course covers strategies and management of maintenance in general, including Computerized Maintenance Management Systems (CMMS), as well as DC and AC testing on electrical equipment insulation. In addition to these topics, the course also covers testing and maintenance of electrical equipment in power systems, including equipment in power generation, substations, transmission, and distribution, such as generators, cables, transformers, switchgear, circuit breakers, and motors. In addition to the theoretical material, equipment testing and analysis will be conducted in the laboratory, including measurements of resistance, inductance, winding capacitance, insulation resistance, Polarization Index, Dielectric Absorption Ratio, contact resistance, grounding resistance, and HiPot testing. Safety procedures, work sequences, and report documentation are also discussed. The course introduces procedures for*

*writing Failure Modes and Effects Analysis (FMEA) and Root Cause Analysis (RCA) reports and includes assignments for practical experience in these areas.*

**Capaian Pembelajaran Lulusan (CPL) Yang Dibebankan Mata Kuliah / Program  
Learning Outcomes Charged to The Course**

- CPL 1 Mampu menunjukkan sikap dan karakter yang mencerminkan: ketakwaan kepada Tuhan Yang Maha Esa, etika dan integritas, berbudi pekerti luhur, peka dan peduli terhadap masalah sosial dan lingkungan, menghargai perbedaan budaya dan kemajemukan, menjunjung tinggi penegakan hukum mendahulukan kepentingan bangsa dan masyarakat luas, melalui kreatifitas dan inovasi, ekselensi, kepemimpinan yang kuat, sinergi, dan potensi lain yang dimiliki untuk mencapai hasil yang maksimal / *Being able to demonstrate attitudes and characteristics that reflect: devotion to the One Almighty God, ethics and integrity, noble virtues, sensitivity and care towards social and environmental issues, appreciation of cultural diversity and inclusivity, upholding the rule of law with a priority on the interests of the nation and the wider community, through creativity and innovation, excellence, strong leadership, synergy, and other potentials possessed to achieve maximum results.*
- CPL 4 Mampu merancang dan melaksanakan eksperimen laboratorium dan/atau lapangan, menganalisa dan menginterpretasi data, serta menggunakan penilaian yang obyektif untuk menarik kesimpulan / *Able to designing and conducting laboratory and/or field experiments, analyzing and interpreting data, and using objective assessments to draw conclusions.*
- CPL 9 Mampu berkomunikasi secara efektif baik dalam bentuk tulisan maupun lisan / *Able to effective communication, both in written and oral forms.*

**Capaian Pembelajaran Mata Kuliah / Course Learning Outcomes**

1. Mampu merancang sistem pemeliharaan sederhana dan konsep implementasi nya pada CMMS / *Able to design a simple maintenance system and its implementation concept in CMMS (Computerized Maintenance Management System).*
2. Mampu menggunakan peralatan uji sesuai prosedur dan petunjuk penggunaan peralatan / *Able to use testing equipment according to procedures and equipment user instructions.*
3. Mampu mengimplementasikan standard pengujian yang berlaku untuk pengujian peralatan menggunakan jenis test AC dan DC / *Able to implement applicable testing standards for equipment using AC and DC testing methods.*
4. Mengetahui mode kegagalan (FMEA) dari beberapa peralatan listrik termasuk generator, trafo, Switchgear, Motor listrik dan membuat laporan Root Cause Analysis (RCA). / *Aware of failure modes (FMEA) for various electrical equipment, including generators, transformers, switchgear, electric motors, and can generate Root Cause Analysis (RCA) reports.*

**Pokok Bahasan / Contents**

1. Konsep dan fisisofa pemeliharaan peralatan listrik Run to Failure, Preventif Maintenance, Predictive Maintenance, Realibility Centered Maintenance, MTTF,

Failure rate, availability, reliability / *Concepts and Philosophies of Electrical Equipment Maintenance: Run to Failure, Preventive Maintenance, Predictive Maintenance, Reliability-Centered Maintenance, MTTF (Mean Time to Failure), Failure Rate, Availability, Reliability*

2. Sistem manajemen pemeliharaan skala besar, konsep Computerized Maintenance Management System (CMMS), dan criticality factor dari peralatan / *Large-Scale Maintenance Management Systems, Concept of Computerized Maintenance Management System (CMMS), and Criticality Factor of Equipment*
3. Jenis test DC untuk peralatan listrik, standard untuk evaluasi hasil test, jenis test DC untuk setiap peralatan listrik : Generator, Motor, Trafo, Cable dan Switchgear / *Types of DC Testing for Electrical Equipment, Standards for Evaluating Test Results, Types of DC Tests for Each Electrical Equipment: Generator, Motor, Transformer, Cable, and Switchgear*
4. Jenis test dengan tegangan tinggi AC untuk peralatan listrik yang sesuai dengan standard kerja yang berlaku / *Types of High Voltage AC Testing for Electrical Equipment in Compliance with Applicable Work Standards*
5. RLC meter, Mega Ohmeter, High Potential Test, Earth resistant meter, Micro ampere meter, Micro ohm meter / *RLC Meter, Megohmmeter, High Potential Test, Earth Resistance Meter, Microampere Meter, Microohmmeter*
6. Keselamatan kerja menggunakan tegangan tinggi / *High Voltage Work Safety*
7. Laporan pengujian dan evaluasi berbasis FMEA, RCA / *Testing and Evaluation Reports Based on FMEA (Failure Modes and Effects Analysis) and RCA (Root Cause Analysis)*

#### **Prasyarat / Pre-requisite**

#### **Pustaka / Reference**

1. Paul Gill, Electrical Power Equipment Maintenance and Testing, Second Edition, December 22, 2008 by CRC Press ISBN 9781574446562.
2. Jose Baptista, Industrial Maintenance: techniques, Stories, and Cases, by CRC Press, 2019, ISBN : 9781000682557
3. Greg C. Stone, Ian Culbert, Edward A. Boulter, Hussein Dhirani, Electrical Insulation for Rotating Machines: Design, Evaluation, Aging, Testing, and Repair, 2nd Edition, July 2014, Wiley-IEEE Press, ISBN: 978-1-118-05706-3