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|  | **UNIVERSITAS SUMATERA UTARA (USU)**  **FAKULTAS TEKNIK**  **DEPARTEMEN TEKNIK ELEKTRO** | | | | | | | | **Kode Dokumen** |
| **RENCANA PEMBELAJARAN SEMESTER** | | | | | | | | | |
| **MATA KULIAH (MK)** | | | **KODE** | **Rumpun MK** | **BOBOT (sks)** | | **SEMESTER** | **Tgl Penyusunan** | |
| **Teknik Tegangan Tinggi** | | | TEE3205 |  | **2 tatap muka**  **1 praktikum** |  |  | 7 AGUSTUS 2022 | |
| **OTORISASI / PENGESAHAN** | | | **Dosen Pengembang RPS** | | **Koordinator RMK** | | **Ka Prodi** | | |
| Ir. Hendra Zulkarnain, MT | | Ir. Hendra Zulkarnain, MT | | Suherman, ST., M.Comp., Ph.D | | |
| **Capaian Pembelajaran** | | **CPL-PRODI yang dibebankan pada MK** | | |  | | | | |
| CPL-1 | Mampu menerapkan pengetahuan matematika, ilmu pengetahuan alam/atau material, teknologi informasi dan kerekayasaan untuk mendapatkan pemahaman menyeluruh tentang prinsip-prinsip Teknik Elektro. | | | | | | |
| CPL-2 | Mampu mendesain komponen, sistem dan/atau proses untuk memenuhi kebutuhan yang diharapkan oleh masyarakat dengan dihadapkan pada batasan realistik yang meliputi aspek hukum, ekonomi, lingkungan, sosial, politik, kesehatan dan keselamatan, keberlanjutan. | | | | | | |
| CPL-3 | Mampu mendesain eksperimen laboratorium dan/atau lapangan serta menganalisis dan mengartikan data untuk memperkuat penilaian teknik khususnya dalam bidang Teknik Elektro. | | | | | | |
| CPL-4 | Mampu menyelesaikan permasalahan teknik khususnya dalam bidang Teknik Elektro secara bertanggungjawab dan memenuhi etika profesi. | | | | | | |
| CPL-5 | Mampu menerapkan metode, keterampilan dan perangkat teknik modern yang diperlukan untuk praktek profesi Teknik Elektro. | | | | | | |
| CPL-6 | Mampu berkomunikasi secara efektif, baik lisan maupun tulisan. | | | | | | |
| CPL-7 | Mampu mengevaluasi tugas-tugas dalam batasan yang ada secara disiplin dan menyeluruh. | | | | | | |
| CPL-8 | Mampu untuk bekerja dalam tim lintas disiplin dan multikultural serta global internasional. | | | | | | |
| CPL-9 | Mampu untuk bertanggung jawab kepada masyarakat dan mematuhi etika profesi dalam menyelesaikan permasalahan Teknik Elektro. | | | | | | |
| CPL-10 | Memiliki kapasitas pembelajaran sepanjang hayat termasuk akses pengetahuan yang relevan tentang isu-isu terkini. | | | | | | |
| CPL-11 | Mampu mengidentifikasi potensi daerah di Sumatera Utara dan menerapkan inovasi, metode, keterampilan, dan perangkat teknik elektro yang relevan untuk mengembangkan potensi daerah tersebut. | | | | | | |
| CPL-12 | Mampu mendesain sistem dan/atau proses untuk memanfaatkan energi baru dan terbarukan sebagai sumber energi listrik alternatif dari potensi sumber daya lokal dan nasional dengan wawasan global. | | | | | | |
| **Capaian Pembelajaran Mata Kuliah (CPMK)** | | |  | | | | |
| CPMK 1 | Memahami dasar-dasar teknik pengujian tegangan tinggi | | | | | | |
| CPMK 2 | Memahami dasar-dasar teori kegagalan pada bahan isolator (padat,cair,gas, vakum) dan memahami sifat-sifat elektrik material isolasi tegangan tinggi | | | | | | |
| CPMK 3 | Memahami teknik-teknik pembangkitan tegangan tinggi (ac, dc dan impuls) dan pengukuran tegangan dan arus tinggi yang dibutuhkan untuk pengujian tegangan tinggi | | | | | | |
| CPMK 4 | Memahami tujuan dan teknik pengujian isolasi tegangan tinggi dan pengujian peralatan tegangan tinggi daya serta mampu melakukan pengujian tegangan tinggi. | | | | | | |
| **Peta CPL – CPMK** | | |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | **CPL 01** | **CPL 02** | **CPL 03** | **CPL 04** | **CPL 05** | **CPL 06** | **CPL 07** | **CPL 08** | **CPL 09** | **CPL 10** | **CPL 11** | **CPL 12** | | CPMK 1 |  |  | **V** | **V** | **V** |  |  |  | **V** |  |  |  | | CPMK 2 |  |  | **V** | **V** | **V** |  |  |  | **V** |  |  |  | | CPMK 3 |  |  | **V** | **V** | **V** |  |  |  | **V** |  |  |  | | CPMK 4 |  |  | **V** | **V** | **V** |  |  |  | **V** |  |  |  | | | | | | | | |
| **Diskripsi Singkat MK** | | Mata kuliah Teknik Tegangan Tinggi membahas penomena dan pengujian tegangan tinggi, sifat-sifat listrik bahan isolasi, pembangkit tegangan tinggi ac/dc/impuls, pengukuran tegangan dan arus tinggi, pengujian bahan isolasi serta pengujian peralatan tenaga listrik. | | | | | | | |
| **Bahan Kajian:** Materi pembelajaran | | Alasan tegangan tinggi, masalah yang timbul akibat tegangan tinggi, korona, EMC, pengaruh tegangan dan arus pada peralatan tegangan tinggi, objek uji, peluahan parsial, tembus listrik, faktor-faktor yang mempengaruhi peluahan, tujuan pengujian tegangan tinggi, pengujian berdasarkan tempat dan waktu, keadaan objek uji, tegangan pengujian, pengaruh kondisi udara, suasana pengujian, pengujian objek terkontaminasi, evaluasi hasil pengujian, fungsi bahan isolasi, rugi-rugi dielektrik, arus bocor dan resistansi bahan isolasi, kekuatan kerak dielektrik, resistansi isolasi kabel, kekuatan dielektrik dan tegangan tembus, beberapa fenomena, Akibat Breakdown/flash over/partial discharge terhadap material isolasi, teori tembus listrik dielektrik gas, teori tembus listrik dielektrik padat, teori tembus listrik dielektrik cair, trafo uji, rangkaian trafo uji, konstruksi trafo uji, belitan trafo uji, rangkaian ekivalen trafo uji, peninggian tegangan sekunder, trafo uji susunan kaskade, kompensasi arus kapasitif, trafo Tesla, trafo resonansi, iioda tegangan tinggi, penyearah setengan gelombang, penyearah Villard, penyearah Greinacher, tegangan impuls standar, sela picu, generator impuls RLC, generator impuls RC, generator impuls rangkaian Marx, generator impuls terpotong, generator arus tinggi impuls, pengukuran tegangan dan arus tinggi, alat ukur tegangan elektroda bola standar, trafo ukur tegangan, pembagi tegangan kapasitif, pembagi tegangan resistif, pengukuran tegangan tinggi Chuf & Fortesque, sifat (properties) bahan isolasi, pengukuran faktor rugi-rugi dielektrik (tanδ), pengukuran resistansi bahan isolasi padat, pengukuran konduktivitas bahan isolasi cair, sengukuran peluahan parsial, pengukuran kekuatan dielektrik isolasi padat, pengukuran kekuatan dielektrik isolasi gas, pengukuran kekuatan dielektrik isolasi cair, pengujian lompatan api AC isolator, pengujian ketahanan tegangan tinggi AC isolaor, pengujian tegangan tembus AC isolator, pengujian lompatan api impuls isolator, pengujian ketahanan tegangan tinggi impuls isolator, mengukur distribusi tegangan isolator rantai, pengujian ketahanan tegangan tinggi AC mesin-mesin listrik, pengujian ketahanan tegangan tinggi impuls mesin-mesin listrik, pengukuran resistansi isolasi mesin-mesin listrik, pengujian ketahanan tegangan AC kabel, pengukuran tg δ kabel, pengukuran peluahan parsial kabel, pengujian ketahanan tegangan tinggi impuls kabel, pengukuran resistansi isolasi kabel, pengujian ketahanan tegangan tinggi AC trafo daya, pengujian ketahanan tegangan tinggi impuls trafo daya, pengukuran tg δ trafo daya, pengukuran resistansi isolasi trafo daya. | | | | | | | |
| **Pustaka** | | **Utama:** |  | | | | | | |
| 1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | | | | | | | |
| **Pendukung:** |  | | | | | | |
| 1. Wolfgang Hauschild, Eberhard Lemke, “High Voltage Test and Measuring Techniques”, Springer, 2013 | | | | | | | |
| **Dosen Pengampu** | |  | | | | | | | |
| **Matakuliah syarat** | |  | | | | | | | |

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| **Mg Ke-** | **Kemampuan akhir tiap tahapan belajar (Sub-CPMK)** | **Penilaian** | | **Bantuk Pembelajaran;**  **Metode Pembelajaran;**  **Penugasan Mahasiswa;**  **[ Estimasi Waktu]** | | **Materi Pembelajaran**  **[Pustaka]** | **Bobot Penilaian (%)** |
| **Indikator** | **Kriteria & Teknik** |
| **(1)** | **(2)** | **(3)** | **(4)** | **Tatap Muka(5)** | **Daring (6)** | **(7)** | **(8)** |
| 1 | Mahasiswa memahami alasan tegangan tinggi, masalah yang timbul akibat tegangan tinggi, korona, EMC, pengaruh tegangan dan arus pada peralatan tegangan tinggi, objek uji, peluahan parsial, tembus listrik, faktor-faktor yang mempengaruhi peluahan, tujuan pengujian tegangan tinggi, pengujian berdasarkan tempat dan waktu, keadaan objek uji, tegangan pengujian, pengaruh kondisi udara, suasana pengujian, pengujian objek terkontaminasi, evaluasi hasil pengujian dan aplikasinya pada sistem tegangan tinggi serta mampu mengaplikasikannya pada sistem tegangan tinggi. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Alasan tegangan tinggi, masalah yang timbul akibat tegangan tinggi, korona, EMC, pengaruh tegangan dan arus pada peralatan tegangan tinggi, objek uji, peluahan parsial, tembus listrik, faktor-faktor yang mempengaruhi peluahan.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 8% |
| 2 | Mahasiswa memahami alasan tegangan tinggi, masalah yang timbul akibat tegangan tinggi, korona, EMC, pengaruh tegangan dan arus pada peralatan tegangan tinggi, objek uji, peluahan parsial, tembus listrik, faktor-faktor yang mempengaruhi peluahan, tujuan pengujian tegangan tinggi, pengujian berdasarkan tempat dan waktu, keadaan objek uji, tegangan pengujian, pengaruh kondisi udara, suasana pengujian, pengujian objek terkontaminasi, evaluasi hasil pengujian dan aplikasinya pada sistem tegangan tinggi serta mampu mengaplikasikannya pada sistem tegangan tinggi. (lanjutan) | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Tujuan pengujian tegangan tinggi, pengujian berdasarkan tempat dan waktu, keadaan objek uji, tegangan pengujian, pengaruh kondisi udara, suasana pengujian, pengujian objek terkontaminasi, evaluasi hasil pengujian  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 3 | Mahasiswa memahami tentang apa yang dimaksud dengan sistem isolasi tegangan tinggi dan sifat-sifat listrik bahan isolasi sebelum melaksanakan pengujian isolasi serta mampu mengaplikasikannya pada sistem tegangan tinggi. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok bahasan:**  Arus bocor dan resistansi bahan isolasi, kekuatan kerak dielektrik, resistansi isolasi kabel, kekuatan dielektrik dan tegangan tembus.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 4 | Mahasiswa memahami tentang apa yang dimaksud dengan sistem isolasi tegangan tinggi dan sifat-sifat listrik bahan isolasi sebelum melaksanakan pengujian isolasi serta mampu mengaplikasikannya pada sistem tegangan tinggi. (lanjutan) | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Beberapa fenomena tegangan tinggi, efek breakdown/flash over/partial discharge terhadap material isolasi, teori tembus listrik dielektrik gas, teori tembus listrik dielektrik padat, teori tembus listrik dielektrik cair  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 5 | Mahasiswa memahami tentang prinsip kerja, jenis-jenis, konstruksi dan karakteristik dari pembangkit tegangan tinggi AC serta mampu membangkitkan tegangan tinggi AC. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Trafo uji, rangkaian trafo uji, konstruksi trafo uji, belitan trafo uji, rangkaian ekivalen trafo uji, peninggian tegangan sekunder, trafo uji susunan kaskade, kompensasi arus kapasitif, trafo Tesla, trafo resonansi.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 6 | Mahasiswa memahami prinsip kerja, jenis-jenis, konstruksi dan karakteristik dari pembangkit tegangan tinggi DC serta mampu melakukan pembangkitan tegangan tinggi impuls. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Dioda tegangan tinggi, penyearah setengan gelombang, penyearah Villard, penyearah Greinacher.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 8% |
| 7 | Mahasiswa memahami standar tegangan impuls yang dibutuhkan pada pengujian, prinsip kerja, jenis-jenis, konstruksi dan karakteristik dari pembangkit tegangan dan arus tinggi impuls serta mampu melakukan pembangkitan tegangan tinggi impuls. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Tegangan impuls standar, sela picu, generator impuls RLC, generator impuls RC, generator impuls rangkaian Marx, generator impuls terpotong, generator arus tinggi impuls.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 8 | UJIAN TENGAH SEMESTER |  |  |  |  |  |  |
| 9 | Mahasiswa memahami peralatan yang digunakan untuk melakukan pengukuran tegangan dan arus tinggi dan serta mampu melakukan metode pengukuran yang aman. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Pengukuran tegangan dan arus tinggi, alat ukur tegangan elektroda bola standar, trafo ukur tegangan.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 10 | Mahasiswa memahami peralatan yang digunakan untuk melakukan pengukuran tegangan dan arus tinggi dan serta mampu melakukan metode pengukuran yang aman. (lanjutan) | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Pembagi tegangan kapasitif, pembagi tegangan resistif, pengukuran tegangan tinggi Chuf & Fortesque  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 11 | Mahasiswa memahami metode pengukuran dan pengujian sifat-sifat listrik bahan isolasi serta mampu melakukan pengukuran bahan isolasi. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Sifat (properties) bahan isolasi, pengukuran faktor rugi-rugi dielektrik (tanδ), pengukuran resistansi bahan isolasi padat, pengukuran konduktivitas bahan isolasi cair  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 12 | Mahasiswa memahami metode pengukuran dan pengujian sifat-sifat listrik bahan isolasi serta mampu melakukan pengukuran bahan isolasi (lanjutan). | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Pengukuran peluahan parsial, pengukuran kekuatan dielektrik isolasi padat, pengukuran kekuatan dielektrik isolasi gas, pengukuran kekuatan dielektrik isolasi cair.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 13 | Mahasiswa memahami jenis dan prosedur pengujian tegangan tinggi yang dilakukan terhadap peralatan isolator jaringan tenaga listrik serta mampu melakukan pengujian isolator. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Pengujian lompatan api AC isolator, pengujian ketahanan tegangan tinggi AC isolaor, pengujian tegangan tembus AC isolator, pengujian lompatan api impuls isolator, pengujian ketahanan tegangan tinggi impuls isolator, mengukur distribusi tegangan isolator rantai.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 14 | Mahasiswa memahami jenis dan prosedur pengujian tegangan tinggi yang dilakukan terhadap peralatan mesin-mesin listrik serta mampu melakukan pengujian mesin-mesin listrik. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Pengujian ketahanan tegangan tinggi AC mesin-mesin listrik, pengujian ketahanan tegangan tinggi impuls mesin-mesin listrik, pengukuran resistansi isolasi mesin-mesin listrik, pengujian ketahanan tegangan AC kabel, pengukuran tg δ kabel, pengukuran peluahan parsial kabel, pengujian ketahanan tegangan tinggi impuls kabel, pengukuran resistansi isolasi kabel.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 15 | Mahasiswa memahami jenis dan prosedur pengujian tegangan tinggi yang dilakukan terhadap transformator daya serta mampu melakukan pengujian transformator daya. | 1. *The accuracy in providing the information required* 2. *The student’s fluency in reading the memo (spelling, intonation, and speed)* 3. *The correctness of the student’s answers* | **Kriteria:**  *Marking Scheme*  **Bentuk:**  *Worksheet* (Non-Tes)   1. *Reading the memo provided.* 2. *Responding to the opening questions given.* 3. *Completing the table (problem-solution) according to the information in the memo.* 4. *Finding the word or phrase with similar meaning (synonym) according to the information in the memo.*   *Classifying the words or phrases with the correct headings.* | BM [(1x(2x60”)]  **Kegiatan:**   1. *Reviewing the previous lessons.* 2. *Reading the added learning materials.* 3. *Recording the presence.* 4. *Responding to opening questions in the ‘Discussion Forum’ section.* 5. *Submitting the assigned tasks.*   PT [(1x(2x60”)]  **Task 3:**  *Restating the information obtained in the form of an a-150-words paragraph.*  **Moda (*Learning Management System*):**  [elearning@usu.ac.id](mailto:elearning@usu.ac.id) | TM [(1x(2x50”)]  **Kegiatan:**   1. *Making notes of the learning materials explained.* 2. *Responding to the questions or instructions given.* 3. *Completing all the provided exercises individually.* 4. *Discussing the exercises completed.*   **Media:**  *Power Point Presentation (PPT)*  *Zoom Meeting*  *Audio Recording*  *English Handout*  **Metode Pembelajaran:**   1. *Online Lecture* 2. *Discussion* 3. *Self-Paced*   *Learning* | **Pokok Bahasan:**  Pengujian ketahanan tegangan tinggi AC trafo daya, pengujian ketahanan tegangan tinggi impuls trafo daya, pengukuran tg δ trafo daya, pengukuran resistansi isolasi trafo daya.  **Referensi:**   1. Bonggas Tobing, “Teknik Pengujian Tegangan Tinggi”, Penerbit Erlangga, Edisi Ketiga, 2017 2. Razevig D.H., “High Voltage Engineering”, Khanna Publisher, Delhi-6, 1982 3. R. S. Jha, “High Voltage Engineering”, Dahanpat Rai & Sons, 1981 | 7% |
| 16 | UJIAN AKHIR SEMESTER |  |  |  |  |  |  |
|  | Total | | | | | | **100** |