

<b>MATA KULIAH</b>	<b>Nama Mata Kuliah</b> : Rangkaian Listrik
	<b>Kode MK</b> : VI190103
	<b>Kredit</b> : 3 SKS
	<b>Semester</b> : I

### **DESKRIPSI MATA KULIAH**

Mata kuliah Rangkaian Listrik termasuk dalam rumpun mata kuliah Instrumentasi di PS S. Tr. TRI – ITS. Mata kuliah ini memberikan pemahaman tentang dasar-dasar rangkaian listrik, prinsip kerja, analisis, dan penggunaan komponen-komponen dasar dalam rangkaian listrik. Mata kuliah ini akan mempelajari konsep dasar tentang hukum-hukum dasar dalam rangkaian listrik seperti hukum Ohm, hukum Kirchhoff, dan hukum Norton-Thevenin. Mahasiswa juga akan belajar tentang resistor, kapasitor, induktor, dan sumber tegangan yang digunakan dalam rangkaian listrik.

### **CAPAIAN PEMBELAJARAN LULUSAN YANG DIBEBANKAN MATA KULIAH**

- Mampu mengkaji kasus penerapan ilmu pengetahuan dan teknologi di bidang keahlian sesuai standar kompetensi kerja, serta mampu mengambil keputusan secara tepat dari hasil kerja sendiri maupun kerja kelompok dalam bentuk laporan tugas akhir atau bentuk kegiatan pembelajaran lain yang luarannya setara dengan tugas akhir melalui pemikiran logis, kritis, inovatif, bermutu dan terukur dengan mempertimbangkan kesehatan, keselamatan, keamanan, dan lingkungan. (CPL-2)
- Mampu berkomunikasi, menulis laporan serta membuat presentasi secara efektif. (CPL-4)
- Mampu menerapkan pengetahuan matematika, ilmu alam, dasar-dasar instrumentasi pengukuran, pengendalian dan pengamanan untuk prosedur, proses, sistem maupun metodologi teknik yang diterapkan dalam suatu proses industri. (CPL-5)

**CAPAIAN PEMBELAJARAN MATA KULIAH**

- Mahasiswa mampu memahami dan menerapkan hukum-hukum tegangan dan arus untuk menyelesaikan persoalan-persoalan rangkaian listrik.
- Mahasiswa mampu mengidentifikasi komponen-komponen dasar dan rangkaian listrik.
- Mahasiswa mampu memahami teknik-teknik analisis rangkaian DC dan rangkaian AC.
- Mahasiswa mampu memahami karakteristik dan menganalisis gelombang-gelombang sinusoid pada rangkaian RL, RC, dan RLC.

**POKOK BAHASAN**

- Komponen-komponen dasar rangkaian listrik
- Hukum-hukum tegangan dan arus
- Hukum Arus Kirchoff
- Hukum Tegangan Kirchoff
- Analisis Nodal, Node Super, Analisa Mesh, Mesh Super.
- Rangkaian Ekvivalen Thavenin dan Norton
- Rangkaian RL, RC, RLC tanpa dan dengan sumber
- Tanggapan Alamiah dan Paksaan
- Gelombang Sinusoid
- Hubungan Arus Tegangan Fasor untuk R,L dan C

**PRASYARAT**

- Fisika Teknik

**PUSTAKA**

Buku:

1. John Bird, Electrical Circuit Theory and Technology 6th Edition, Routledge, 2017.
2. James W. Nilsson, Susan A. Riedel, Electric Circuits 10th Edition, Pearson, 2015.
3. Joseph A. Edminister, Mahmood Nahvi, Electric Circuits 4th Edition, McGraw-Hill, 2003.

<b>COURSE</b>	<b>Course Name</b> : Electrical Circuits
	<b>Course Code</b> : VI0103
	<b>Credit</b> : 3 sks
	<b>Semester</b> : I

<b>DESCRIPTION OF COURSE</b>
<p>The Electrical Circuits course is included in the Instrumentation course family at PS S. Tr. TRI - ITS. This course provides an understanding of the basics of electrical circuits, working principles, analysis, and use of basic components in electrical circuits. This course will learn basic concepts about basic laws in electrical circuits such as Ohm's law, Kirchhoff's law, and Norton-Thevenin's law. Students will also learn about resistors, capacitors, inductors, and voltage sources used in electrical circuits.</p>
<b>LEARNING OUTCOMES</b>
<ul style="list-style-type: none"><li>▪ Able to review cases of the application of science and technology in the field of expertise according to work competency standards, and able to make appropriate decisions from the results of their own work and group work in the form of a final project report or other forms of learning activities whose output is equivalent to the final project through logical, critical, innovative, quality and measurable thinking by considering health, safety, security and the environment. (CPL-2)</li><li>▪ Able to communicate, write reports and make presentations effectively. (SLO-4)</li><li>▪ Able to apply knowledge of mathematics, natural sciences, the basics of measurement instrumentation, control and security for procedures, processes, systems and engineering methodologies applied in an industrial process. (SLO-5)</li></ul>
<b>COURSE LEARNING OUTCOME</b>
<ul style="list-style-type: none"><li>▪ Students can understand and apply a voltage and current laws to solve electrical circuit problems.</li><li>▪ Students can identify basic components and electrical circuits.</li></ul>

- Students can understand the techniques of DC circuit analysis and AC circuit.
- Students can understand the characteristics and analyze sinusoid waves in the RL, RC and RLC circuits.

### **MAIN SUBJECT**

- Basic components of electrical circuits
- Laws of voltage and current
- Kirchoff's Current Laws
- Kirchoff's Current Laws
- Nodal Analysis, Super Node, Mesh Analysis, Super Mesh.
- Thevenin and Norton Equivalent Series
- RL, RC, RLC circuits without and with sources
- Natural and Coercive Responses
- Sinusoid Waves
- Fasor Voltage Current Relations for R, L and C

### **PREREQUISITES**

- Technical Physics

### **REFERENCE**

Book:

1. John Bird, Electrical Circuit Theory and Technology 6th Edition, Routledge, 2017.
2. James W. Nilsson, Susan A. Riedel, Electric Circuits 10th Edition, Pearson, 2015.
3. Joseph A. Edminister, Mahmood Nahvi, Electric Circuits 4th Edition, McGraw-Hill, 2003.