

## TECHNOLOGY 271: Electrical Fundamentals and Circuit Analysis II

**2007-08 Catalog Data:** TECH 271 Electrical Fundamentals and Circuit Analysis II

**Catalog Description:** Study of elementary circuits and analysis; resonance and antiresonance circuits; power and energy; frequency responses of coupled circuits, nonsinusoidal waves and filter circuits; electromagnetic-field concept.

**Prerequisite:** TECH 270

**Co-requisite:** MATH 229 and TECH 271A

**Textbooks:**

- Robbins & Miller, Circuit Analysis, Delmar, 2004

**Instructor:** Dr. Said Oucheriah

Learning Objectives	Relational ABET Learning Outcomes
Learn to apply the superposition theorem	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to determine the Thevenin equivalent of circuits having independent and/or dependent sources.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to determine the Norton equivalent of circuits having independent and/or dependent sources.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>

<p>Learn to apply maximum power transfer theorem.</p>	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> </ul>
<p>Learn to determine the resonant frequency and bandwidth of a simple series or parallel circuit.</p>	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> </ul>
<p>Learn to sketch the impedance, current, and power response curves of a series resonant circuit.</p>	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> </ul>
<p>Learn to find the quality factor, Q, of a resonant circuit and determine the bandwidth for a given set of conditions.</p>	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> </ul>
<p>Learn to explain the dependence of bandwidth on the L/C ratio and R for both series and a parallel circuit.</p>	<ul style="list-style-type: none"> <li>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</li> <li>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</li> <li>F. An ability to identify, analyze and solve technical problems.</li> </ul>

<p>Learn to design a resonant circuit for a given set of parameters.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn to evaluate the power gain and voltage gain of a given system.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn to identify and design simple first-order low-pass, high-pass, band-pass and band-stop filters.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn to write the standard form of a transfer function for a given filter and sketch the its Bode plot.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
<p>Learn how a transformer couples energy from its primary to its secondary via a changing magnetic field.</p>	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics,</p>

	<p>science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to describe basic transformer construction.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to determine voltage and current ratios from the turns ratio and use the dot convention to determine transformer phasing.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to use transformers to impedance match loads.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to solve for the coefficients of the Fourier Series of a simple periodic waveform.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p>B. An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p>D. An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.</p> <p>F. An ability to identify, analyze and solve technical problems.</p>
Learn to sketch the frequency spectrum of a periodic waveform.	<p>A. An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p>

	<p><b>B.</b> An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p><b>F.</b> An ability to identify, analyze and solve technical problems.</p>
<p>Learn to use Laplace transform techniques to analyze electrical circuits</p>	<p><b>A.</b> An appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines.</p> <p><b>B.</b> An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.</p> <p><b>F.</b> An ability to identify, analyze and solve technical problems.</p>