Lecture 1

Inside Cover of Book

Great Prof. Hayt! I had him.

Excellent!

Engineering about solving problems!!

Great book - 3 key laws

- Ohm's Law
- Kirchhoff's Voltage Law
- Kirchhoff's Current Law

Show Syllabus → Recitation Time

Linearity, Superposition - key to circuits

\[ f(x_1 + x_2) = f(x_1) + f(x_2) \]

Non-linearity: \[ f(x) = e^x \]

\[ e^4 = e = 2.718 \]

Euler's number

Inside cover - Resistor Color Code (3 bands)

Resistors Carboy

<table>
<thead>
<tr>
<th>Band Color</th>
<th>Resistance Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>1</td>
</tr>
<tr>
<td>Brown</td>
<td>2</td>
</tr>
<tr>
<td>Red Orange</td>
<td>3</td>
</tr>
</tbody>
</table>

Tolerance Band (tells how accurate they were made)

EX: Red Brown Orange / Gold

\[ 2 4 3 \quad -21k\Omega, 5\% \]
we will use computer tools - Get MATLAB from Poly
Get PSPICE from Web.

**Units must follow numbers**

\[ \text{Power} = \frac{\text{Energy}}{\text{Time}} = \frac{\text{Force} \times \text{Distance}}{\text{Time}} \]

\[ 1 \text{J} = \frac{\text{kg} \cdot \text{m}^2}{\text{s}^2} \]

Units cancel out

- length in meters (m)
- mass or weight (kg)
- time - seconds (s)

Electrical current - Ampere (A)

Thermodynamic temperature - Kelvin (K)

Amount of a substance - Mole (mol)

Luminous intensity - Candela (cd)

When writing numbers, engineers should always represent a number between 1 and 999, and use metric unit (kilo, mega, Giga, Terra)

\[ 10^3 \quad 10^6 \quad 10^9 \quad 10^{12} \]

\[ \text{(milli micro nano pico)} \]

Ex. \( 4.7 \times 10^{-7} \) ohms

\[ = 0.47 \, \text{m} \Omega \]
Moving charge = current flow is i = \frac{q}{t} = \frac{1}{4.6 \times 10^{-19}} \text{C/s}

So, 1 AMP = 1.6 \times 10^{19} \text{electrons passing a point in 1 second}

One electron has 1.6 \times 10^{-19} \text{C}

- Charge = units of Coloumb (C)
- Current = 1 AMP
- Time = second
- Charge = Amps x Coloumb/second
- "i" = 1 AMP
- "t" = 1 second
- "q" = 1.6 \times 10^{-19} \text{C}

Going into an absorbing circuit, current flow is no longer present.
Think of current as water flowing "charge moving".
Think of voltage as a water tank storage, ready to allow water (current) to flow "ready to do work" if a circuit is complete loop.

Quizzes first thing, every Tue & Sun.
Sharp - Closed book $ note

2 examples of "absorbed power" on board -
practice current directly
absorbed vs. generated power

Ex. 2.6 p. 17