Assignment #3  Due Today  11:59 PM

No assignment this week

Midterm 1  - Thu 10-10:50AM
- Chapters 1, 2, 3, & 4.1-4.3
- Closed book/notes
  Reference equation notesheet will be provided
- NO Calculators
- Sample exam posted
  (more details later today)

Help Session Wed 6-7pm  WNGR 151
Special Office Hours: Thu 8:45AM-9:15AM
b by appointment  KEC 4095

Previous class

Wrapped up Series/parallel connection of resistors
- Voltage division
- Current division
Y - Δ (Wye-Delta) transformation

Node voltage (nodal) analysis

1. Label all nodes; assign one node as a reference
   (reference is ground or 0 potential)
2. Use KCL at each unknown node in terms of branch currents
   (essential node)
3. Define each unknown branch current in terms of node voltages
4. Solve system of equations for the unknown node voltages
Example \( V_1 = 11V \)
Unknown node voltages are \( V_2 \) and \( V_3 \)

KCL @ node 2: \(-I_1 + I_2 + I_3 = 0\)
KCL @ node 3: \(-I_3 + I_4 + 2 = 0\)

\[
\begin{align*}
I_1 &= \frac{V_1 - V_2}{R_1} = \frac{11 - V_2}{1} \\
I_2 &= \frac{V_2 - 0}{R_2} = \frac{V_2}{1} \\
I_3 &= \frac{V_2 - V_3}{R_3} = \frac{V_2 - V_3}{1} \\
I_4 &= \frac{V_3 - 0}{R_4} = \frac{V_3}{1}
\end{align*}
\]

Solve system of equations \( V_2 = 4V, \quad V_3 = 1V \)

Supernode after midterm

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**Midterm Review**

Chapter 1: Charge \( q(c) \), Current \( i(A) \), Voltage \( v(V) \)

\[
i = \frac{dq}{dt}
\]

Reference directions for current/voltage

Power = \( \frac{dW}{dt} \) work done or energy \( (J) \)

\[
= v_i
\]

Passive sign convention

\[
p = vi \quad >0 \text{ absorbed} \quad <0 \text{ supplied}
\]

\[
\begin{array}{c}
3A \\
\downarrow
\end{array}
\quad \begin{array}{c}
\uparrow 2V
\end{array}
\]

\( p = 2 \times 3 = 6 \text{ W} \)
Chapter 2

Independent voltage and current sources

\[ \begin{align*}
&\begin{array}{c}
+\text{1V} \\
2\text{A}
\end{array} \\
\end{align*} \]

Dependent (controlled) voltage and current sources

\[ \begin{align*}
&\begin{array}{c}
+ \\
- \\
\end{array} \\
&\begin{array}{c}
1_3 = 2\text{A} \quad \text{(CCCS)} \\
\end{array} \\
&\begin{array}{c}
v_3 = 3v_A \quad \text{(VCCS)}
\end{array}
\]

Resistor \[ v = iR \quad R = \frac{v}{i} \quad i = \frac{v}{R} \]

\[ \text{KCL \& KVL} \]

Chapter 3

Series and parallel connections of resistors

Voltage division
Current division

Two resistors in parallel: \[ R_{eq} = \frac{R_1R_2}{R_1 + R_2} \]

Equal \( R \): \[ R_{eq} = \frac{R}{2} \]

\[ \text{Y-Δ (Wye-Delta) transformation/conversion} \]

\[ \begin{align*}
&36\Omega \\
&24\Omega
\end{align*} \]

\[ \begin{align*}
&36\Omega + 24\Omega + 12\Omega = 72\Omega
\end{align*} \]

Equal resistances

\[ \begin{align*}
&\begin{array}{c}
R \\
M \\
\end{array} \\
&\begin{array}{c}
R \\
M \\
\end{array}
\end{align*} \]

For equal \( R \):
\[ R_3 = 3R_y \quad R_y = \frac{R_3}{3} \]

Chapter 4 (4.1 - 4.3)

Node voltage (nodal) analysis: No supernodes