EE 10 – Sample Midterm

Problem 1 (10 points)

Find:

\[ i_1 = \quad \quad \quad v_1 = \quad \quad \quad P_{BY\ the\ 15A} = \quad \quad \quad \]

\[ i_2 = \quad \quad \quad v_2 = \quad \quad \quad P_{BY\ the\ 5V} = \quad \quad \quad \]

\[ i_3 = \quad \quad \quad v_3 = \quad \quad \quad \]

Problem 2 (10 points)

Find:

\[ i_1 = \quad \quad \quad i_2 = \quad \quad \quad \]

\[ i_3 = \quad \quad \quad v_1 = \quad \quad \quad \]
Problem 3(12 points)

Using nodal analysis, find:
   a. the voltage, \( V_a \).
   b. the power delivered to the dependent source

\[
\begin{align*}
&\text{\begin{tikzpicture}
&\node[ground] (ground) at (0,0) {};
&\node[charge] (charge) at (0,2) {};
&\node[voltage source] (vs) at (0,0) {8V};
&\node[resistor] (r1) at (1,0) {2\Omega};
&\node[resistor] (r2) at (2,0) {6\Omega};
&\node[resistor] (r3) at (3,0) {3\Omega};
&\node[source] (source) at (2,2) {2i_a};
&\node[ground] (ground2) at (4,0) {};
&\node[voltage source] (vs2) at (4,0) {2A};
&\draw[->] (charge) -- (r1);
&\draw[->] (r1) -- (r2);
&\draw[->] (r2) -- (r3);
&\draw[->] (r3) -- (source);
&\draw[->] (source) -- (ground2);
&\end{tikzpicture}}
\end{align*}
\]

Problem 4(15 points)

For the circuit shown above:
   a. Find the Norton equivalent of the circuit to the left of a-b
   b. Find the Thevenin equivalent of the circuit to the left of a-b
   c. Find the value of \( R \) that would result in maximum transfer of power to \( R \).
Problem 5 (1 point)

An open circuit always has zero volts across it. True or False? (circle answer)

Problem 6 (1 point)

A short circuit may have current flowing through it. True or False? (circle answer)

Problem 7 (1 point)

Which of the resistor voltage/current values shown CANNOT occur (circle the correct answer below):

a. A
b. B
c. C
d. D
e. B and C
f. They can all occur