Problem 1 - RMS

Find the RMS voltages for the following. Show all your work.

a) \( v(t) = 3\sin(4\pi t) \)

b) \( v(t) = 4\sin(8\pi t) + 1 \)

c) \( v(t) \) as shown in the figure below

\[
\begin{array}{c}
\text{v(t)} \\
3 \\
0 \quad 2 \quad 4 \quad 6 \quad 8 \quad 10 \quad 12 \quad t(\text{sec})
\end{array}
\]

Problem 2

Find:
\( C_{AD}, C_{BD} \)

Given:
\( C_1 = 40 \ \mu\text{F} \)
\( C_2 = 60 \ \mu\text{F} \)
\( C_3 = 30 \ \mu\text{F} \)
\( C_4 = 10 \ \mu\text{F} \)
\( C_5 = 15 \ \mu\text{F} \)
\( C_6 = 60 \ \mu\text{F} \)

Find:
\( L_{BC}, L_{CD} \)

Given:
\( L_1 = 6 \ \text{mH} \)
\( L_2 = 12 \ \text{mH} \)
\( L_3 = 3 \ \text{mH} \)
\( L_4 = 6 \ \text{mH} \)
\( L_5 = 6 \ \text{mH} \)
\( L_6 = 3 \ \text{mH} \)
Problem 3

Given:

\[ C = 10 \text{ mF} \]
\[ v_c(t) = 4\cos(3\pi t) \text{ V} \]

Find: \(i_c(t)\)

Problem 4

Given:

\[ C = 2 \mu\text{F} \]
\[ i_c(t) = 0 \text{ A for } t<0 \]
\[ t^2 \text{ A for } 0 < t < 2 \text{ sec.} \]
\[ 4 \text{ A for } t > 2 \text{ sec} \]

Find:

- \(v_c(t)\) at \(t=4\) sec.
- The energy stored in the capacitor at \(t=4\) sec.

Problem 5

Given:

\[ L = 100 \text{ mH} \]
\[ i_L(t) = 0 \text{ A for } t<0 \]
\[ 2t^3 \text{ A for } 0 < t < 2 \text{ sec.} \]
\[ 16 \text{ A for } t > 2 \text{ sec} \]

Find:

- The energy stored in the inductor for all time.
- Plot the energy versus time.

Problem 6

The circuit shown is **DC and in steady state**.

a) Find the current through the inductor and the voltage across the capacitor.

b) Find the energy stored in each.

Given:

\[ R_1 = 2.2 \text{ k}\Omega, R_2 = 1.5 \text{ k}\Omega \]
\[ R_3 = 1 \text{ k}\Omega, R_4 = 1 \text{ k}\Omega, \]
\[ L = 1 \text{ H}, C=1\text{mF} \]
\[ V_S = 12 \text{ V} \]