Problem 1 –

Given:
\( I_s = 4 \text{A}, \ C = 2 \text{F}, \ L = 3 \text{H} \)
\( R_1 = 1 \Omega, \ R_2 = 2 \Omega, \ R_3 = 3 \Omega \)

\( W_L = \frac{1}{2} L i_s(t)^2 \)
\( W_C = \frac{1}{2} C v(t)^2 \)

Given that the circuit is DC and in Steady state:
1. Find the voltage across the capacitor.
2. Find the current through the inductor.
3. Find the energy stored in the capacitor.
4. Find the energy stored in the inductor.

\[
V_C = V_{22} = V_{21} = V_{33} = I_3 R_3
\]
\[
\dot{I}_L = \dot{I}_{R1}
\]
\[
V_C = \frac{\dot{I}_3 R_3}{4} = \frac{3}{4} V = V_C
\]
\[
\dot{I}_{R1} = \frac{1}{R_1} + \frac{1}{R_3}
\]
\[
I_3 = \frac{\dot{I}_{R1}}{1 + \frac{1}{3}} = \frac{\dot{I}_{R1}}{\frac{4}{3}} = \frac{3}{4} \dot{I}_{R1}
\]
\[
W_L = \frac{1}{2} L (3)^2 = \frac{27}{2} \text{J}
\]
\[
W_C = \frac{1}{2} C (2)^2 = 9 \text{J}
\]

Problem 2 on back
Problem 2

Given:
\( i_s(t) = 2\sin(2t) \) A,
\( v_E(t) = 10\cos(2t) \) A
\( C=2 \text{ F}, L=3 \text{ H}, R=1 \text{ } \Omega \)

Find:
1. Phasor representations for sources.
2. Impedance representations for passive elements.
3. Write equations to solve for the voltage across the capacitor. Do not calculate.

\[ i_s(j\omega) = \frac{2}{\sqrt{2}} \text{ A} \]
\[ v_E(j\omega) = 10 + 0 \text{ V} \]
\( \omega = 2\pi \text{ rad/sec} \)

\( \frac{Z_R}{j\omega} = 1+j0 = 1+j0 \Omega \)
\( \frac{Z_C}{j\omega L} = 0+j(2\times2) = 0+j4 = 4\angle90^\circ \Omega \)

\[ Z_C = \frac{j}{\omega C} = \frac{1}{2\times2} = \frac{1}{4} = \frac{1}{4} + j0 \Omega \]

\( i_E = \frac{1}{j\omega} = \frac{-j}{2\times2} = \frac{-j}{4} = \frac{1}{4} - j0 \Omega \)

\[ \frac{1}{4} + j\frac{\sqrt{2}}{2} \]