1. (30 points)

a. Calculate the value of rms current, \( I_{\text{rms}} \), flowing through \( z_L \).

b. Calculate the complex power, \( S \), for \( z_L \). Include appropriate units.

2. (30 points)

Balanced three-phase, positive-sequence system

\[ I_{aA} = 15 \angle 0^\circ \text{A} \]
\[ Z_g = (0.2 + j0.2) \Omega \]
\[ V_{aA} = 22.5 \angle 53.13^\circ \text{V} \]
\[ Z_\Delta = (30 + j24) \Omega \]

a. Draw a single-phase equivalent circuit.

b. Calculate \( I_{AB} \).
3. (40 points)

\[
i(t) = 100 \cos(2000t) \text{V}
\]

\[
\frac{N_1}{N_2} = 2
\]

a. Write a numerical time-domain expression for the current \(i(t)\).

b. Calculate \(V_1\).