ECE 336, spring 2024, Homework #6, **Due: March 20, 2024, 1:00 PM**

1.) A three-phase system has a line-to-line voltage

$$\mathbf{V}_{BA} = 1414 \angle -15° \text{ V rms}$$

with a Y load. Find the phase voltages when the phase sequence is *abc*.

2.) A Y-connected source and load are shown in Figure 1. (a) Determine the rms value of the current $i_A(t)$. (b) Determine the average and reactive power delivered to the load.

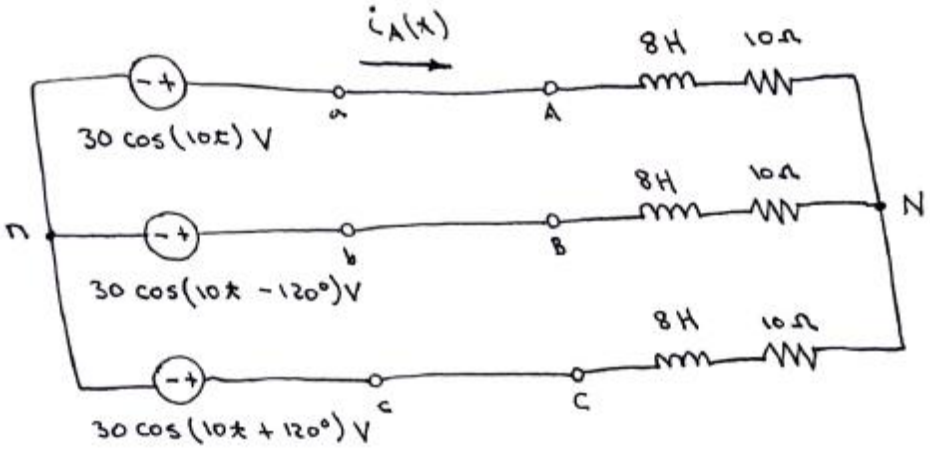

Figure 1

3.) An unbalanced Y-Y circuit is shown in Figure 2. Find the complex power delivered to the load.

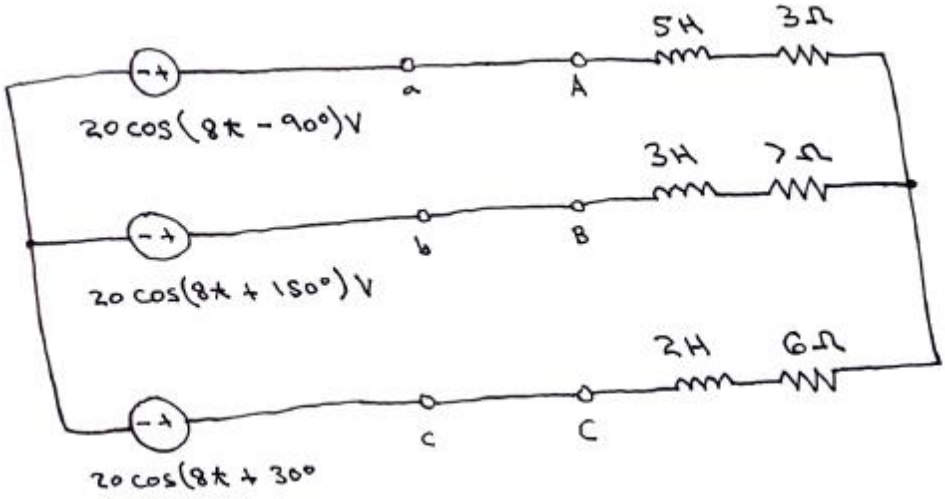

Figure 2

4.) An unbalanced four-wire Y-Y circuit is shown in Figure 3. (a) Find the line currents i_a, i_b, i_c, and i_n. (b) Find the complex power absorbed by each phase of the load.

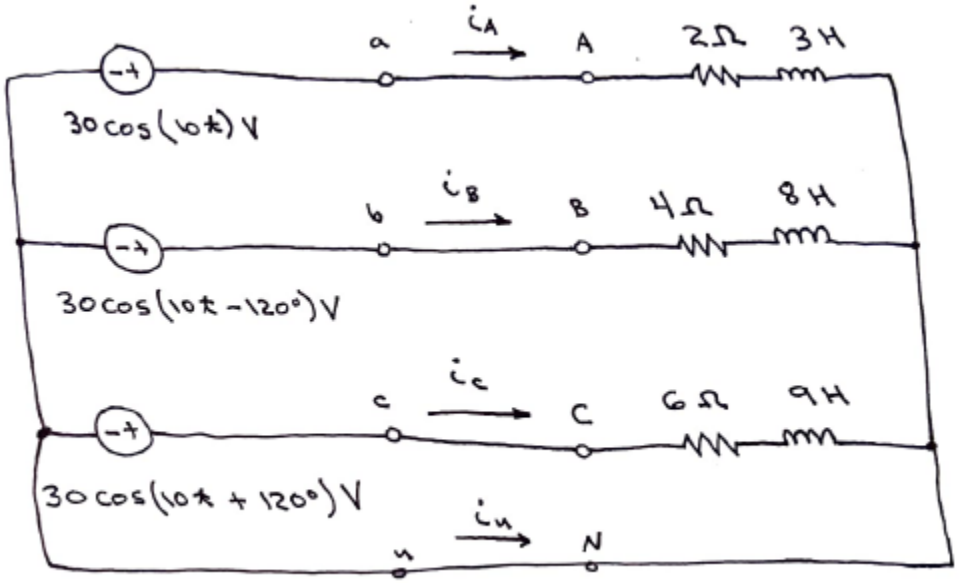

Figure 3

5.) A three-phase circuit has two parallel balanced Δ loads, one of 33-Ω resistors and one of 47-Ω resistors. Find the magnitude of the total line current when the line-to-line voltage is 220 V rms.

6.) A balanced Δ-connected load is connected by three wires, each with a 12-Ω resistance, to a Y source with

$\mathbf{V}_a = (480/\sqrt{3})\angle -30°$ V rms, $\mathbf{V}_b = (480/\sqrt{3})\angle -150°$ V rms, and $\mathbf{V}_c = (480/\sqrt{3})\angle 90°$ V rms.

Find the line current $\mathbf{I}_A$ when $\mathbf{Z}_\Delta = 16\angle -75°\ \Omega$.

7.) For the three-phase circuit shown in Figure 4 determine $i(t)$ and the total complex power delivered by the three-phase source.

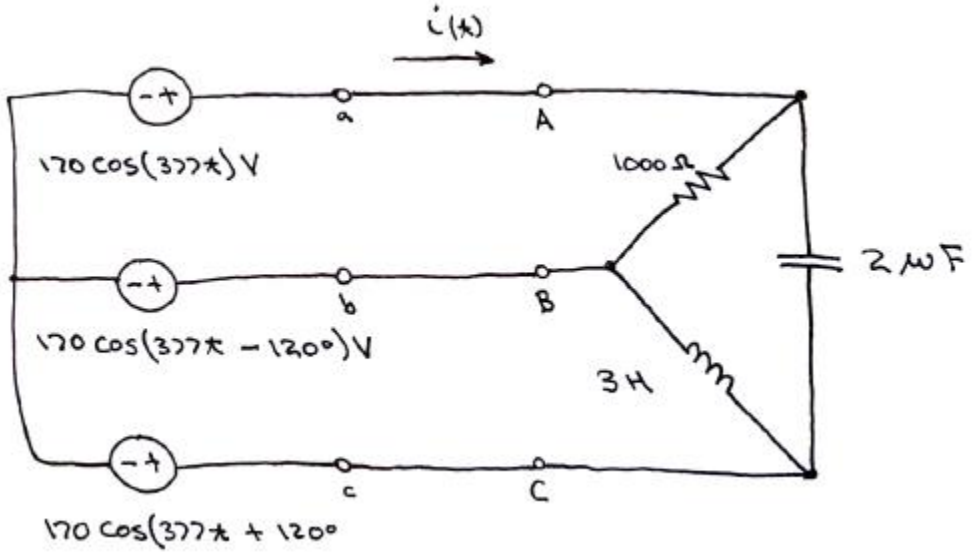

Figure 4