Serial # ○

- 1 points for not writing your serial number

King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE205: Electric Circuit II (082)
Quiz 1: Balanced Three Phase Y-Connected Systems

Name: KEY Ver. 2

The magnitude of the line voltage at the terminals of a balanced Y-connected load is 12,800 V. The load impedance is 216+*j*63 Ω/Ø. The load is fed from a line that has an impedance of 0.25+*j*2 Ω/Ø. Assume the sequence is positive.

a) If $\mathbf{V}_{AB}$ is the reference voltage, what is $\mathbf{V}_{BC}$ and $\mathbf{V}_{CA}$

$V_{AB} = 12{,}800\text{ V} \angle 0^\circ \Rightarrow V_{BC} = 12{,}800 \angle -120^\circ \text{ V}$ ✓ ✓

$V_{CA} = 12{,}800 \angle +120^\circ \text{ V}$ ✓ (3)

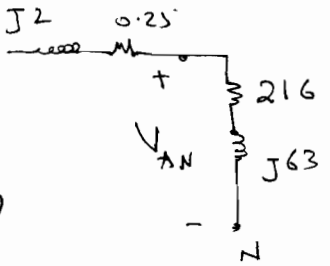
b) Find $\mathbf{V}_{AN}$.

$\vec{V}_{AB} = \sqrt{3}\, \vec{V}_{AN} \angle 30^\circ \Rightarrow \vec{V}_{AN} = \frac{\vec{V}_{AB}}{\sqrt{3}} \angle -30^\circ = \frac{12{,}800}{\sqrt{3}} \angle -30^\circ$ ✓

$\vec{V}_{AN} = 7390.08 \angle -30^\circ$ ✓ (2)

c) What is the magnitude of the line current?

$I_{aA} = \left| \frac{V_{AN}}{216+j63} \right| = \left| \frac{12\,800 \angle -30^\circ}{(\sqrt{3})(216+j63)} \right|$ ✓



(2)

$|I_{aA}| = 32.845 \text{ A}$ ✓

d) What is the magnitude of the line voltage at the source?

$|V_{an}| = |I_{aA} (J2 + 0.25 + 216 + J63)|$ (2)

$= |I_{aA} (216.25 + J65)| = 7416.61 \text{ V}$

$|V_{ab}| = |\sqrt{3} V_{an} \angle 30^\circ| = \sqrt{3} |V_{an}|$ (1)

$|V_{ab}| = 12{,}845.94 \text{ V}$

Good Luck, **Dr. Ali Muqaibel**