

Name: KEY

ID#

Sec. 01

The magnitude of the line voltage at the terminals of a balanced Y-connected load is 4,160 V. The load impedance is $72+j21 \Omega/\emptyset$. The load is fed from a line that has an impedance of $0.08+j0.7 \Omega/\emptyset$.

a) What is the magnitude of the line current?

$$I_{aA} = \frac{4160}{\sqrt{3} (72+j21)} = \frac{4160}{\sqrt{3} 75 \angle 16.26^\circ} = 32 \angle -16.26^\circ$$

$$|I_{aA}| = 32 \text{ A}$$

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

$$V_{an} = \frac{4160}{\sqrt{3}} + (32 \angle -16.26^\circ) (0.08 + j0.7)$$

$$= 2401.78 + 22.55 \angle 67.22^\circ$$

$$= 2410.51 + j 20.79$$

$$= 2410.6 \angle 0.49^\circ$$

$$|V_{AB}| = \sqrt{3} (2410.6) = 4174.24 \text{ V}$$