

$$V_a = 330 \angle -120^\circ \text{ V}$$

$$V_b = 330 \angle 120^\circ \text{ V}$$

Balanced, positive phase sequence

(b)  $V_a = 622 \angle 0^\circ \text{ V}$

$$V_b = 622 \angle -240^\circ \text{ V} = 622 \angle 120^\circ \text{ V}$$

$$V_c = 622 \angle 240^\circ \text{ V} = 622 \angle -120^\circ \text{ V}$$

Balanced, negative phase sequence

(c)  $V_a = 170 \angle -90^\circ \text{ V}$

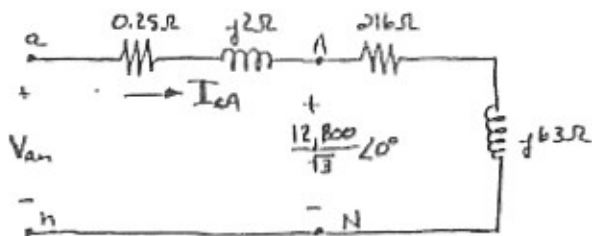
(d)  $V_a = 170 \angle -30^\circ \text{ V}$

$$V_b = 170 \angle 90^\circ \text{ V}$$

$$V_c = 170 \angle -150^\circ \text{ V}$$

Balanced, negative phase sequence

P 11.0 [a]



$$I_{ca} = \frac{12,800}{\sqrt{3}(216 + j63)} = 32.84 \angle -16.26^\circ \text{ A (rms)}$$

$$|I_{ca}| = |I_L| = 32.84 \text{ A (rms)}$$

$$[b] V_{ab} = \frac{12,800}{\sqrt{3}} + (32.84 \angle -16.26^\circ)(0.25 + j2) = 7416.61 \angle 0.47^\circ$$

$$|V_{AB}| = \sqrt{3}(7416.61) = 12,845.94 \text{ V (rms)}$$

P 11.7 [a]  $I_{aA} = \frac{4800 \angle 0^\circ}{192 + j56} = 24 \angle -16.26^\circ \text{ A}$

$$I_{bB} = 24 \angle 120 - 16.26^\circ = 24 \angle 103.74^\circ \text{ A}$$

$$I_{cC} = 24 \angle -136.26^\circ \text{ A}$$

[b]  $V_{\phi H} = 4800 \angle 0^\circ \text{ V}$

$$V_{\phi H} = 4800 \angle 120^\circ \text{ V}$$

$$V_{\phi H} = 4800 \angle -120^\circ \text{ V}$$

$$V_{AB} = \sqrt{3} \angle -30^\circ V_{\phi H} = 8313.84 \angle -30^\circ \text{ V}$$

$$V_{BC} = 8313.84 \angle 90^\circ \text{ V}$$

$$V_{CA} = 8313.84 \angle -150^\circ \text{ V}$$

[c]  $V_{an} = (24 \angle -16.26^\circ)(190 + j40) = 4659.96 \angle -4.37^\circ \text{ V}$

$$V_{bn} = 4659.96 \angle 115.63^\circ \text{ V}$$

$$V_{cn} = 4659.96 \angle -124.37^\circ \text{ V}$$

[d]  $V_{ab} = \sqrt{3} \angle -30^\circ V_{an} = 8071.28 \angle -31.37^\circ \text{ V}$

$$V_{bc} = 8071.28 \angle 85.63^\circ \text{ V}$$

$$V_{ca} = 8071.28 \angle -154.37^\circ \text{ V}$$

$V_{an}$   
 $V_{bn}$   
 $V_{cn}$   
 $V_{ab}$   
 $V_{bc}$   
 $V_{ca}$   
  
 $V_{AN}$   
 $V_{BN}$   
 $V_{CN}$   
  
 $V_{AB}$   
 $V_{BC}$   
 $V_{CA}$

$$P 11.11 \quad [a] \quad I_{AB} = \frac{33,000}{360 + j105} = 88 \angle -16.26^\circ \text{ A}$$

$$I_{BC} = 88 \angle -136.20^\circ \text{ A}$$

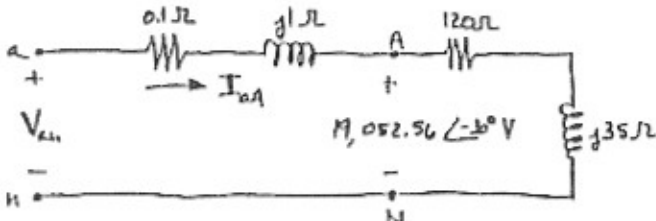
$$I_{CA} = 88 \angle 103.74^\circ \text{ A}$$

$$[b] \quad I_{LA} = \sqrt{3} \angle -30^\circ I_{AB} = 152.42 \angle -46.26^\circ \text{ A}$$

$$I_{LB} = 152.42 \angle -166.26^\circ \text{ A}$$

$$I_{LC} = 152.42 \angle 73.74^\circ \text{ A}$$

[c]



$$V_{LN} = 19,052.50 \angle -30^\circ + (0.1 + j1.0)(152.42 \angle -46.26^\circ)$$

$$= 19,110.40 \angle -29.57^\circ \text{ V}$$

$$V_{ab} = \sqrt{3} \angle 30^\circ V_{LN} = 33,100.18 \angle 0.43^\circ \text{ V}$$

$$V_{bc} = 33,100.18 \angle -119.57^\circ \text{ V}$$

$$V_{ca} = 33,100.18 \angle 120.43^\circ \text{ V}$$