(1)

Part (a):

$$L_{\text{af}} = \frac{\sqrt{2}\, V_{\text{l-l,rms}}}{\sqrt{3}\,\omega I_{\text{f}}} = 58.0 \text{ mH}$$

Part (b): Voltage $= (50/60) \times (345/515) \times 13.8$ kV $= 7.70$ kV.

(2)

$\dot{E}_a$ and F_a $\dot{E}_\delta$ and F_δ F_δ

The fundamental component of EMF induced by the field

MMF in one phase armature winding.

(3)

Part (a): The windings are orthogonal and hence the mutual inductance is zero.

Part (b): Since the two windings are orthogonal, the phases are uncoupled and hence the flux linkage under balanced two-phase operation is unchanged by currents in the other phase. Thus, the equivalent inductance is simply equal to the phase self-inductance.