

- 11.19** 9.574 V
11.21 7.906 V
11.23 2.92 V, 4.267 W
11.25 1.08 V
11.27 6.667 A
11.29 275.6 VA, 0.1876 (lagging)
11.31 (a) 0.5547 (leading), (b) 0.9304 (lagging)
11.33 (a) $95.26 - j55$ VA, 110 VA, 95.26 W, 55 VAR, leading pf
 (b) $1497.2 + j401.2$ VA, 1550 VA, 1497.2 W, 401.2 VAR, lagging pf
 (c) $278.2 + j74.54$ VA, 288 VA, 278.2 W, 74.54 VAR, lagging pf
 (d) $-961.7 - j961.7$ VA, 1360 V, -961.7 W, -961.7 VAR, leading pf
11.35 (a) $269 - j150$ VA, (b) $4129 - j2000$ VA, (c) $396.9 + j450$ VA,
 (d) $1000 + j681.2$ VA
11.37 (a) $30.98 - j23.23$ Ω , (b) $10.42 + j13.89$ Ω , (c) $0.8 + j1.386$ Ω
11.39 $-j3.84$ VA (capacitor), 5.12 VA (resistor), $j6.4$ VA (inductor)
11.41 $4.543 + j1.396$ VA
11.43 51.2 mVA
11.45 $7.098 \angle 32.29^\circ$, 0.8454 (lagging)
11.47 $120.1 \angle 0.03145^\circ$ V
11.49 $80 \mu\text{W}$
11.51 No power across the capacitors, $S_{10} = 4 \times 10^{-4}$, $S_{20} = 8 \times 10^{-4}$,
 $S_{40} = 4 \times 10^{-4}$ VA
11.53 (a) 0.6402, (b) 295.1 W, (c) 130.4 μF
11.55 (a) 2.734 mF, (b) 6.3 mF
11.57 (a) 0.8992, (b) 5.74 mF
11.59 9.476 W
11.61 4.691 W
11.63 \$76.26
11.65 $75 - j103.55$ Ω
11.67 (a) 126.2 W, (b) 220 VA
11.69 968.2 kVAR
11.71 (a) 32.91 kVAR, 86.51 kVA, (b) 0.9248, (c) 157.3 A
11.73 (a) \$ 14,521.80, (b) \$ 31,579.2, (c) Yes
11.75 (a) $40 - j8$ Ω , (b) 66.61 W

Chapter 12

- 12.1** (a) $231 \angle -30^\circ$, $231 \angle -150^\circ$, $231 \angle -270^\circ$ V,
 (b) $231 \angle 30^\circ$, $231 \angle 150^\circ$, $231 \angle -90^\circ$ V
12.3 *acb* sequence, $208 \angle 250^\circ$ V
12.5 $242.5 \angle -30^\circ$, $242.5 \angle -150^\circ$, $242.5 \angle 90^\circ$ V

- 12.7** $44 \angle 53.13^\circ$, $44 \angle -66.87^\circ$, $44 \angle 173.1^\circ$ A
12.9 $4.8 \angle -36.87^\circ$, $4.8 \angle -156.9^\circ$, $4.8 \angle 83.13^\circ$ A
12.11 $127 \angle 100^\circ$ V, $220 \angle 130^\circ$ V, $17.32 \angle 150^\circ$ A, $12.7 \angle -80^\circ$ Ω
12.13 13.66 A
12.15 $172.6 \angle 34.76^\circ$, $172.6 \angle -85.24^\circ$, $172.6 \angle 154.8^\circ$ V, $11.51 \angle -18.37^\circ$,
 $11.51 \angle -138.4^\circ$, $11.51 \angle 101.6^\circ$ A
12.17 $5.47 \angle -18.43^\circ$, $5.47 \angle -138.43^\circ$, $5.47 \angle 101.57^\circ$ A,
 $9.474 \angle -48.43^\circ$, $9.474 \angle -168.43^\circ$, $9.474 \angle 71.57^\circ$ A
12.19 $15.53 \angle -28.4^\circ$, $15.53 \angle -148.4^\circ$, $15.53 \angle 91.6^\circ$ A
12.21 $17.74 \angle 4.78^\circ$, $17.74 \angle -115.2^\circ$, $17.74 \angle 124.8^\circ$ A
12.23 $5.081 \angle -46.87^\circ$, $5.081 \angle -166.87^\circ$, $5.081 \angle 73.13^\circ$ A
12.25 $4.15 - j5.53 \Omega$, $5000 - j6667$ VA
12.27 7.69 A, 360.3 V
12.29 55.51 A, $1.298 - j1.731 \Omega$
12.31 423.1 W
12.33 9.021 A
12.35 $4.373 - j1.145$ kVA
12.37 $6346 \angle 28.92^\circ$ V
12.39 40.42 A (rms), 0.9677 (lagging)
12.41 $5.75 \angle 220^\circ$ A
12.43 $3.464 \angle 30^\circ$, $3.464 \angle 0^\circ$, $3.464 \angle 60^\circ$ A
12.45 (a) $132 \angle 30^\circ$ A, $47.23 \angle 143.8^\circ$ A, $120.9 \angle 230.9^\circ$ A, (b) 29.04 kW,
(c) $29.04 - j58.08$ kVA
12.47 $220.6 \angle -34.56^\circ$, $214.1 \angle -81.49^\circ$, $49.91 \angle -50.59^\circ$ V, assuming
that N is grounded.
12.49 $11.15 \angle 37^\circ$ A, $230.8 \angle -133.4^\circ$ V, assuming N is grounded.
12.51 $\mathbf{I}_{aA} = 4.71 \angle 71.38^\circ$, $\mathbf{I}_{bB} = 6.781 \angle -142.6^\circ$,
 $\mathbf{I}_{cC} = 3.898 \angle -5.076^\circ$ V, $\mathbf{I}_{AB} = 3.547 \angle 61.57^\circ$,
 $\mathbf{I}_{BC} = 3.831 \angle -164.9^\circ$, $\mathbf{I}_{AC} = 1.357 \angle 97.8^\circ$ V
12.53 (a) 120 V, (b) 2.5, 3, 2, 0.866 A, (c) 300, 360, 240 W, (d) 900 W
12.55 (a) 4801 VA, (b) 0.9372, (c) 8.4 A, (d) 190.5 V
12.57 (a) 2590 W, 4808 W, (b) 8335 VA
12.59 -2995 W, 2995 W
12.61 (a) 20 mA, (b) 200 mA
12.63 320 W
12.65 $17.15 \angle -19.65^\circ$, $15.14 \angle -139.6^\circ$, $15.14 \angle 100.3^\circ$ A,
 $196.8 \angle 2.97^\circ$, $196.8 \angle -117^\circ$, $196.82 \angle 123^\circ$ V
12.67 516 V

- 12.69** $Z_Y = 2.133 \Omega$
12.71 $1.448 \angle -176.6^\circ$ A, 1252 + $j711.6$ VA, 1085 + $j721.2$ VA

Chapter 13

- 13.1** 10 H
13.3 150 mH, 50 mH, 25 mH, 0.2887
13.5 $(R_1 + j\omega L_1)\mathbf{I}_1 - j\omega M\mathbf{I}_2, -j\omega M\mathbf{I}_1 + (R_2 + j\omega L_2)\mathbf{I}_2$
13.7 $2.392 \angle 94.57^\circ$ V
13.9 $\frac{jI_m(\omega L - 1/\omega C)}{R + j\omega L + 1/j\omega C}$
13.11 $V_{Th} = 5.349 \angle 34.11^\circ$ V, $Z_{Th} = 2.332 \angle 50^\circ \Omega$
13.13 $2.462 \angle 72.18^\circ$ A, $0.878 \angle -97.48^\circ$ A, $3.329 \angle 74.89^\circ$ A, 43.67 mJ
13.15 $3.199 \angle -175.2^\circ$ A
13.17 (a) 0.3535, (b) $0.3217 \cos(4t + 57.6^\circ)$ V, (c) 1.168 J
13.19 $3.755 \angle -36.34^\circ$ A, $3.755 \angle 143.7^\circ$ A
13.21 0.984, 130.5 mJ
13.23 (a) $L_a = 10$ H, $L_b = 15$ H, $L_c = 5$ H, (b) $L_A = 18.33$ H, $L_B = 27.5$ H, $L_C = 55$ H
13.25 $12.77 + j7.15 \Omega$
13.27 $1.324 \angle -53.05^\circ$ k Ω
13.29 0.5 A, -1.5 A
13.31 $\frac{V_m}{nR} \cos \omega t$ A, $-\frac{V_m}{n^2 R} \cos \omega t$
13.33 $2.963 \angle 32.9^\circ$ V, $2.963 \angle -147.1^\circ$ V
13.35 $8 - j1.5 \Omega$, $2.95 \angle 10.62^\circ$ A
13.37 (a) 5, (b) 8 W
13.39 1054 W
13.41 (a) $25.9 \angle 69.96^\circ$, $12.95 \angle 69.96^\circ$ A (rms), (b) $21.06 \angle 147.4^\circ$,
 $42.12 \angle 147.4^\circ$, $42.12 \angle 147.4^\circ$ V(rms), (c) $1554 \angle 20.04^\circ$ VA
13.43 $P_{8\Omega} = 2.778$ W, $P_{2\Omega} = 11.11$ W, $P_{4\Omega} = 5.556$ W
13.45 6 A, 0.36 A, -60 V
13.47 $3.795 \angle 18.43^\circ$, $1.897 \angle 18.43^\circ$, $0.6325 \angle 161.6^\circ$
13.49 $1.245 \angle -33.76^\circ$, $0.8893 \angle -33.76^\circ$, $0.3557 \angle 146.2^\circ$ A, 7.51 W
13.51 74.9 W
13.53 (a) $\frac{1}{3}$, (b) 1604, 2778 A, (c) 2778, 4812 A
13.55 (a) delta-delta connection, (b) 66.67, 13.05 A, (c) 16.67, 28.87 A,
(d) 55 kVA
13.57 (a) 144.3 A, (b) 238.7, (c) 13.05 A
13.59 $4.253 \angle -8.526^\circ$ A, $1.564 \angle 27.49^\circ$ A, 4.892 W