P06 r = 2.0 m, $v = 1.0\times10^5$ m/s & q = 1.8 μC. $\Delta t = 2\pi r/v = 1.26\times10^{-4}$ s, $I = \Delta q/\Delta t$ = 0.0143 A .

P19 $\rho = 1.70\times10^{-8}$ Ω·m, d = 1.024 mm & ℓ = 20 m: (**a**) $R = \rho L/A$ = 0.413 Ω; (**b**) $V = IR$ = 4.95 V .

P22 $\rho = 10^{-6}$ Ω·m, diameter d = 1.0 mm. $R = \rho L/A$, $L = RA/\rho = \pi(d/2)^2R/\rho$ = 19.7 m .

P24 $\Delta R = R_0\alpha\Delta T$, $\Delta R/R_0 = 0.00450\times(36.0–15.0) = 9.45\%$.

P27 P = 100 W, V = 120 V, $P = IV = V^2/R$: (**a**) $I = P/V$ = 0.833 A; (**b**) $R = V^2/P$ = 144 Ω .

P29 P = 1500 W, V = 120 V, α = 0.0045, $\rho_0 = 5.6\times10^{-8}$ Ω·m & L = 4 m. $R = V^2/P$ = 9.60 . $\rho = \rho_0(1+\alpha\Delta T) = 1.64\times10^{-7}$ Ω·m, $A = \rho L/R = 6.8\times10^{-8}$ m^2 .

P42 ε = 3.0 V, R_v = 4 Ω & R_h = 6 Ω: (**a**) The resistance of right loop, $R_a^{-1} = 1/4 + 1/16 = 5/16$, R_a = 3.2 Ω, $R_{eq} = 6 + R_a + 6$ = 15.2 Ω; (**b**) $I = \varepsilon/R_{eq}$ = 0.197 A .

P46 R_{245} = 2.73 Ω & R_{362} = 1.00 Ω, so R_{245} & R_{362} in series 3-Ω gives R_A = 6.73 Ω . (**a**) $R_{eq} = R_A$+9 Ω = 15.73 Ω; (**b**) R_{39} = 2.25 Ω, $R_{eq} = R_A + R_{39}$ = 8.98 Ω; (**c**) The total current draw is I = 12.0/8.98 = 1.34 (A), $I_4 = IR_5/(R_5 + R_{24})$ = 0.609 A

P49 R = 5 Ω: (**a**) R_a = (3)(5) = 15 Ω, R_b = 15/4 Ω, $R_c = 10+R_b$ = 55/4 Ω, R_d = 11/3 = 3.67 Ω, R_{eq} = 13.67 Ω; (**b**) $I = V/R_{eq}$ = 0.439 A; (**c**) $I_6 = 5I/(5 + R_c)$ = 0.117 A, $I_1 = I_6 R_a/(5 + R_a)$ = 0.088 (A); (**d**) I_2 = 0 .

P51 For junction f, $I_1 + I_2 + I_3 = 0$; For loop abcfa, $12 – 14I_2 – 3 = 0$, I_2 = 9/14 = 0.643 (A); for loop cdefc, $–6 + 10I_1 + 3 = 0$, I_1 = 0.300 A. $I_3 = –(I_1 + I_2)$ = 0.943A .

P53 I_3 = 3A. (**a**) For junction b, $I_2 = I_1 + I_3$ …①. For loop abefa, $–3I_3 – 6I_2 + 9 = 0$, $6I_2 = 9 – 9 = 0$. From ①, $I_1 = –I_3$ = –3.0 A; (**b**) For loop bcdeb, $–\varepsilon + 4I_1 + 6I_2 = 0$, $\varepsilon = 4I_1$ = –12.0 V; (**c**) $V_4 = 4I_1$ = 12.0 V .

P55 (**a**) For junction d, $I_1 + I_2 + I_3 = 0$, or I2 = $–I_1$ – I3 …①; For loop abcda, $–20I_1 + 6 – 3 + 20I_2 = 0$ …②. For loop dcfed, $–20I_2 + 3 – 8 + 15I_3 = 0$ …③. Substitute ① into ② and ③, we have $40I_1 + 20I_3 = 3$ and $4I_1 + 7I_3 = 1$. Therefore, I_3 = 0.140 A, I_1 = 0.005 A, and I_2 = –0.145 A; (**b**) $V_6 = 6I_3$ = 0.84 V, $V_8 = 8I_1$ = 0.04 V, $V_9 = 9I_3$ = 1.26 V, $V_{12} = 12I_1$ = 0.06 V, $V_{20} = 20I_2$ = –2.9V .

P63 P_i = 1200 + 60 + 600 = 1860 (W), $I_i = P_i/V$ = 15.5 A. $P_f = P_i$ + 40.0 = 1900 W, I_f = 15.83 A. So the rating of the fuse is between 15.5 A and 15.8 A .