

$$R_{23} = \left(\frac{1}{R_2} + \frac{1}{R_3} \right)^{-1} = \left(\frac{1}{3.0 \, \Omega} + \frac{1}{2.0 \, \Omega} \right)^{-1} = \left(0.83 \frac{1}{\Omega} \right)^{-1} = 1.2 \, \Omega \quad \text{أ.}$$

$$R_{\text{مكافئة}} = R_1 + R_{23} = 4.5 \, \Omega + 1.2 \, \Omega = \boxed{5.7 \, \Omega}$$

$$I = \frac{\Delta V}{R_{\text{مكافئة}}} = \frac{9.0 \, \text{V}}{5.7 \, \Omega} = \boxed{1.6 \, \text{A}} \quad \text{ب.}$$

$$I_1 = I = \boxed{1.6 \, \text{A}} \quad \text{ج.}$$

$$\Delta V_{23} = IR_{23} = (1.6 \, \text{A})(1.2 \, \Omega) = 1.9 \, \text{V}$$

$$I_2 = \frac{\Delta V_{23}}{R_2} = \frac{1.9 \, \text{V}}{3.0 \, \Omega} = \boxed{0.63 \, \text{A}}$$

$$I_3 = \frac{\Delta V_{23}}{R_3} = \frac{1.9 \, \text{V}}{2.0 \, \Omega} = \boxed{0.95 \, \text{A}}$$

$$\Delta V_1 = I_1 R_1 = (1.6 \, \text{A})(4.5 \, \Omega) = \boxed{7.2 \, \text{V}} \quad \text{د.}$$

$$\Delta V_2 = \Delta V_3 = \Delta V_{23} = \boxed{1.9 \, \text{V}}$$

$$\Delta V = 9.0 \, \text{V} \quad \text{36.}$$

$$R_1 = 4.5 \, \Omega$$

$$R_2 = 3.0 \, \Omega$$

$$R_3 = 2.0 \, \Omega$$

$$R_{\text{مكافئة}} = R_1 + R_2 = 18.0 \, \Omega + 6.0 \, \Omega = 24.0 \, \Omega$$

$$I_1 = I_2 = I = \frac{\Delta V}{R_{\text{مكافئة}}} = \frac{18.0 \, \text{V}}{24.0 \, \Omega} = \boxed{0.750 \, \text{A}}$$

$$\Delta V_1 = I_1 R_1 = (0.750 \, \text{A})(18.0 \, \Omega) = \boxed{13.5 \, \text{V}}$$

$$\Delta V_2 = I_2 R_2 = (0.750 \, \text{A})(6.0 \, \Omega) = \boxed{4.5 \, \text{V}}$$

$$R_1 = 18.0 \, \Omega \quad \text{37.}$$

$$R_2 = 6.0 \, \Omega$$

$$\Delta V = 18.0 \, \text{V}$$

$$R_{12} = \left(\frac{1}{R_1} + \frac{1}{R_2} \right)^{-1} = \left(\frac{1}{30.0 \, \Omega} + \frac{1}{15.0 \, \Omega} \right)^{-1} \quad \text{ب.}$$

$$R_{12} = \left(0.0333 \frac{1}{\Omega} + 0.0667 \frac{1}{\Omega} \right)^{-1} = \left(0.1000 \frac{1}{\Omega} \right)^{-1} = 10.00 \, \Omega$$

$$R_{\text{مكافئة}} = R_{12} + R_3 = 10.00 \, \Omega + 5.00 \, \Omega = \boxed{15.00 \, \Omega}$$

$$I_3 = I = \frac{\Delta V}{R_{\text{مكافئة}}} = \frac{30.0 \, \text{V}}{15.00 \, \Omega} = \boxed{2.00 \, \text{A}} \quad \text{ج.}$$

$$\Delta V_{12} = IR_{12} = (2.00 \, \text{A})(10.00 \, \Omega) = 20.0 \, \text{V}$$

$$I_1 = \frac{\Delta V_{12}}{R_1} = \frac{20.0 \, \text{V}}{30.00 \, \Omega} = \boxed{0.667 \, \text{A}}$$

$$I_2 = \frac{\Delta V_{12}}{R_2} = \frac{20.0 \, \text{V}}{15.0 \, \Omega} = \boxed{1.33 \, \text{A}}$$

$$\Delta V_1 = \Delta V_2 = \Delta V_{12} = \boxed{20.0 \, \text{V}} \quad \text{د.}$$

$$\Delta V_3 = I_3 R_3 = (2.00 \, \text{A})(5.00 \, \Omega) = \boxed{10.0 \, \text{V}}$$

$$R_1 = 30.0 \, \Omega \quad \text{38.}$$

$$R_2 = 15.0 \, \Omega$$

$$R_3 = 5.00 \, \Omega$$

$$\Delta V = 30.0 \, \text{V}$$

$$R_1 = \frac{\Delta V}{I_1} = \frac{12 \, \text{V}}{3.0 \, \text{A}} = \boxed{4.0 \, \Omega}$$

$$R_2 = 12 \, \Omega \quad \text{39.}$$

$$\Delta V = 12 \, \text{V}$$

$$I_1 = 3.0 \, \text{A}$$

$$40. R_1 = 18.0 \, \Omega$$

$$R_2 = 6.0 \, \Omega$$

$$\Delta V = 18.0 \, \text{V}$$

$$\Delta V_1 = \Delta V_2 = \Delta V = 18.0 \, \text{V}$$

$$I_1 = \frac{\Delta V_1}{R_1} = \frac{18.0 \, \text{V}}{18.0 \, \Omega} = 1.00 \, \text{A}$$

$$I_2 = \frac{\Delta V_2}{R_2} = \frac{18.0 \, \text{V}}{6.0 \, \Omega} = 3.0 \, \text{A}$$

$$41. R_1 = 90.0 \, \Omega$$

$$R_2 = 10.0 \, \Omega$$

$$R_3 = 10.0 \, \Omega$$

$$R_4 = 90.0 \, \Omega$$

$$R_{\text{مكافئة},S} = 2R_{\text{مكافئة},S}$$

دائرة مفتوحة:

$$R_{12} = R_1 + R_2 = 90.0 \, \Omega + 10.0 \, \Omega = 100.0 \, \Omega$$

$$R_{34} = R_3 + R_4 = 10.0 \, \Omega + 90.0 \, \Omega = 100.0 \, \Omega$$

$$R_{1234} = \left(\frac{1}{R_{12}} + \frac{1}{R_{34}} \right)^{-1} = \left(\frac{1}{100.0 \, \Omega} + \frac{1}{100.0 \, \Omega} \right)^{-1} = \left(0.02000 \frac{1}{\Omega} \right)^{-1} = 50.00 \, \Omega$$

$$R_{\text{مكافئة}} = R + R_{1234} = R + 50.00 \, \Omega$$

دائرة مغلقة:

$$R_{13} = \left(\frac{1}{R_1} + \frac{1}{R_3} \right)^{-1} = \left(\frac{1}{90.0 \, \Omega} + \frac{1}{10.0 \, \Omega} \right)^{-1}$$

$$R_{13} = \left(0.0111 \frac{1}{\Omega} + 0.100 \frac{1}{\Omega} \right)^{-1} = \left(0.111 \frac{1}{\Omega} \right)^{-1} = 9.00 \, \Omega$$

$$R_{24} = \left(\frac{1}{R_2} + \frac{1}{R_4} \right)^{-1} = \left(\frac{1}{10.0 \, \Omega} + \frac{1}{90.0 \, \Omega} \right)^{-1} = 9.00 \, \Omega$$

$$R_{\text{مكافئة},S} = R + R_{13} + R_{24} = R + 9.00 \, \Omega + 9.00 \, \Omega = R + 18.02 \, \Omega$$

$$R_{\text{مكافئة},S} = 2R_{\text{مكافئة},S}$$

$$R + 50.00 \, \Omega = 2(R + 18.00 \, \Omega) = 2R + 36.00 \, \Omega$$

$$2R - R = 50.00 \, \Omega - 36.00 \, \Omega$$

$$R = 14.0 \, \Omega$$

$$42. R = 20.0 \, \Omega$$

أ. مقاومان موصولان على التوالي مع مقاومين موصولين على التوازي:

$$R_{\text{مكافئة}} = R + R + \left(\frac{2}{R} \right)^{-1} = 20.0 \, \Omega + 20.0 \, \Omega + \left(\frac{2}{20.0 \, \Omega} \right)^{-1} = 50.0 \, \Omega$$

ب. أربعة مقاومات موصولة على التوازي:

$$R_{\text{مكافئة}} = \left(\frac{4}{R} \right)^{-1} = \frac{R}{4} = \frac{20.0 \, \Omega}{4} = 5.00 \, \Omega$$

$$\Delta V = 12.0 \text{ V} \quad 43$$

$$R_1 = 30.0 \, \Omega$$

$$R_2 = 50.0 \, \Omega$$

$$R_3 = 90.0 \, \Omega$$

$$R_4 = 20.0 \, \Omega$$

$$R_{12} = R_1 + R_2 = 30.0 \, \Omega + 50.0 \, \Omega = 80.0 \, \Omega \quad \text{أ.}$$

$$R_{123} = \left(\frac{1}{R_{12}} + \frac{1}{R_3} \right)^{-1} = \left(\frac{1}{80.0 \, \Omega} + \frac{1}{90.0 \, \Omega} \right)^{-1}$$

$$R_{123} = \left(0.0125 \frac{1}{\Omega} + 0.0111 \frac{1}{\Omega} \right)^{-1} = \left(0.0236 \frac{1}{\Omega} \right)^{-1} = 42.4 \, \Omega$$

$$R_{\text{مكافئة}} = R_{123} + R_4 = 42.4 \, \Omega + 20.0 \, \Omega = \boxed{62.4 \, \Omega}$$

$$I = \frac{\Delta V}{R_{\text{مكافئة}}} = \frac{12.0 \text{ V}}{62.4 \, \Omega} = \boxed{0.192 \text{ A}} \quad \text{ب.}$$

$$\Delta V_{123} = IR_{123} = (0.192 \text{ A})(42.4 \, \Omega) = 8.14 \text{ V} \quad \text{ج.}$$

$$I_{12} = \frac{\Delta V_{123}}{R_{12}} = \frac{8.14 \text{ V}}{80.0 \, \Omega} = 0.102 \text{ A}$$

$$I_1 = I_2 = \boxed{0.102 \text{ A}}$$

$$\Delta V_2 = I_{12}R_2 = (0.102 \text{ A})(50.0 \, \Omega) = 5.10 \text{ V} \quad \text{د.}$$

$$P_2 = \frac{(\Delta V_2)^2}{R_2} = \frac{(5.10 \text{ V})^2}{50.0 \, \Omega} = \boxed{0.520 \text{ W}}$$

$$\Delta V_4 = IR_4 = (0.192 \text{ A})(20.0 \, \Omega) = 3.84 \text{ V} \quad \text{هـ.}$$

$$P_4 = \frac{(\Delta V_4)^2}{R_4} = \frac{(3.84 \text{ V})^2}{20.0 \, \Omega} = \boxed{0.737 \text{ W}}$$

$$\Delta V = 6.0 \text{ V} \quad 44$$

$$\Delta V_A = 4.0 \text{ V} \text{ (على التوالي)}$$

$$I_B = 2.0 \text{ A} \text{ (على التوازي)}$$

$$\Delta V = \Delta V_A + \Delta V_B \quad \text{على التوالي:}$$

$$\Delta V_B = \Delta V - \Delta V_A = 6.0 \text{ V} - 4.0 \text{ V} = 2.0 \text{ V}$$

$$I_B = \frac{\Delta V_B}{R_B} = \frac{2.0 \text{ V}}{3.0 \, \Omega} = 0.67 \text{ A}$$

$$I_A = I_B = 0.67 \text{ A}$$

$$R_A = \frac{\Delta V_A}{I_A} = \frac{4.0 \text{ V}}{0.67 \, \Omega} = \boxed{6.0 \, \Omega}$$

$$\Delta V_A = \Delta V_B = 6.0 \text{ V} \quad \text{على التوازي:}$$

$$R_B = \frac{\Delta V_B}{I_B} = \frac{6.0 \text{ V}}{2.0 \, \Omega} = \boxed{3.0 \, \Omega}$$

أو بطريقة أخرى:

$$I_B = 2.0 \text{ A} \text{ ، } \Delta V_B = 6.0 \text{ V} \text{ في حالة التوازي:}$$

$$R_B = \frac{\Delta V_B}{I_B} = \boxed{3.0 \, \Omega}$$

$$\Delta V_B = 2.0 \text{ V} \text{ في حالة التوالي:}$$

$$I_B = \frac{\Delta V_B}{R_B} = \frac{2.0 \text{ V}}{3.0 \, \Omega} = \frac{2}{3} \text{ A}$$

$$I_B = I_A = \frac{2}{3} \text{ A}$$

$$R_A = \frac{\Delta V_A}{I_A} = \frac{4.0 \text{ V}}{\frac{2}{3} \text{ A}} = \boxed{6.0 \, \Omega}$$

$$\begin{aligned}
 R_{789} &= R_7 + R_8 + R_9 = 3.0 \, \Omega + 4.0 \, \Omega + 3.0 \, \Omega = 10.0 \, \Omega \quad \text{أ.} \\
 R_{5789} &= \left(\frac{1}{R_5} + \frac{1}{R_{789}} \right)^{-1} = \left(\frac{1}{10.0 \, \Omega} + \frac{1}{10.0 \, \Omega} \right)^{-1} = \left(0.200 \frac{1}{\Omega} \right)^{-1} = 5.00 \, \Omega \\
 R_{456789} &= R_4 + R_{5789} + R_6 = 3.0 \, \Omega + 5.00 \, \Omega + 2.0 \, \Omega = 10.0 \, \Omega \\
 R_{2456789} &= \left(\frac{1}{R_2} + \frac{1}{R_{456789}} \right)^{-1} = \left(\frac{1}{10.0 \, \Omega} + \frac{1}{10.0 \, \Omega} \right)^{-1} = \left(0.200 \frac{1}{\Omega} \right)^{-1} = 5.00 \, \Omega \\
 R_{\text{مكافئة}} &= R_1 + R_{2456789} + R_3 = 5.0 \, \Omega + 5.00 \, \Omega + 4.0 \, \Omega = \boxed{14.0 \, \Omega} \\
 I &= \frac{\Delta V}{R_{\text{مكافئة}}} = \frac{28 \, \text{V}}{14.0 \, \Omega} = \boxed{2.0 \, \text{A}} \quad \text{ب.} \\
 I_1 &= I = \boxed{2.0 \, \text{A}}
 \end{aligned}$$

$$\begin{aligned}
 R_1 &= 5.0 \, \Omega \quad \text{46.} \\
 R_2 &= 10.0 \, \Omega \\
 R_3 &= 4.0 \, \Omega \\
 R_4 &= 3.0 \, \Omega \\
 R_5 &= 10.0 \, \Omega \\
 R_6 &= 2.0 \, \Omega \\
 R_7 &= 3.0 \, \Omega \\
 R_8 &= 4.0 \, \Omega \\
 R_9 &= 3.0 \, \Omega \\
 \Delta V &= 28 \, \text{V}
 \end{aligned}$$

$$\begin{aligned}
 R_{23} &= \left(\frac{1}{R_2} + \frac{1}{R_3} \right)^{-1} = \left(\frac{1}{10.0 \, \Omega} + \frac{1}{5.0 \, \Omega} \right)^{-1} \quad \text{أ.} \\
 R_{23} &= \left(0.100 \frac{1}{\Omega} + 0.20 \frac{1}{\Omega} \right)^{-1} = \left(0.30 \frac{1}{\Omega} \right)^{-1} = 3.3 \, \Omega \\
 R_{234} &= R_{23} + R_4 = 3.3 \, \Omega + 4.0 \, \Omega = 7.3 \, \Omega \\
 R_{2345} &= \left(\frac{1}{R_{234}} + \frac{1}{R_5} \right)^{-1} = \left(\frac{1}{7.3 \, \Omega} + \frac{1}{3.0 \, \Omega} \right)^{-1} \\
 R_{2345} &= \left(0.14 \frac{1}{\Omega} + 0.33 \frac{1}{\Omega} \right)^{-1} = \left(0.47 \frac{1}{\Omega} \right)^{-1} = 2.1 \, \Omega \\
 R_{\text{مكافئة}} &= R_1 + R_{234} = 3.0 \, \Omega + 2.1 \, \Omega = \boxed{5.1 \, \Omega} \\
 \Delta V &= \sqrt{PR_{\text{مكافئة}}} = \sqrt{(4.00 \, \text{W})(5.1 \, \Omega)} = \boxed{4.5 \, \text{V}} \quad \text{ب.}
 \end{aligned}$$

$$\begin{aligned}
 P &= 4.00 \, \text{W} \quad \text{47.} \\
 R_1 &= 3.0 \, \Omega \\
 R_2 &= 10.0 \, \Omega \\
 R_3 &= 5.0 \, \Omega \\
 R_4 &= 4.0 \, \Omega \\
 R_5 &= 3.0 \, \Omega
 \end{aligned}$$

$$\begin{aligned}
 P &= I\Delta V \\
 P_{\text{سخان}} + P_{\text{محمصة}} &= I\Delta V \\
 I &= \frac{2(1200 \, \text{W})}{220 \, \text{V}} = 11 \, \text{A} \\
 \boxed{11 \, \text{A} < 15 \, \text{A}} &\quad \text{نعم، لأن } 11 \, \text{A} < 15 \, \text{A}
 \end{aligned}$$

$$\begin{aligned}
 P_{\text{محمصة}} &= 1200 \, \text{W} \quad \text{48.} \\
 P_{\text{سخان}} &= 1200 \, \text{W} \\
 \Delta V &= 220 \, \text{V} \\
 I_m &= 15 \, \text{A}
 \end{aligned}$$

$$\begin{aligned}
 I &= \frac{P_{\text{سخان}}}{\Delta V} = \frac{1300 \, \text{W}}{220 \, \text{V}} = \boxed{5.9 \, \text{A}} \quad \text{أ.} \\
 I &= \frac{P_{\text{محمصة}}}{\Delta V} = \frac{1100 \, \text{W}}{220 \, \text{V}} = \boxed{5.0 \, \text{A}} \\
 I &= \frac{P_{\text{مشوى}}}{\Delta V} = \frac{1500 \, \text{W}}{220 \, \text{V}} = \boxed{6.8 \, \text{A}} \quad \text{ب.}
 \end{aligned}$$

$$\begin{aligned}
 P_{\text{سخان}} &= 1300 \, \text{W} \quad \text{49.} \\
 P_{\text{محمصة}} &= 1100 \, \text{W} \\
 P_{\text{مشوى}} &= 1500 \, \text{W} \\
 \Delta V &= 220 \, \text{V}
 \end{aligned}$$

$$\begin{aligned}
 I_{\text{كلية}} &= 5.9 \, \text{A} + 5.0 \, \text{A} = 6.8 \, \text{A} = \boxed{17.7 \, \text{A}} \\
 \boxed{17.7 \, \text{A} < 30.0 \, \text{A}} &\quad \text{نعم، لأن } 17.7 \, \text{A} < 30.0 \, \text{A}
 \end{aligned}$$

المعطى

الحل

$$\begin{aligned}
 R_{\text{مكافئة}} &= R_1 + R_2 + R_3 = 3R & R_1 = R_2 = R_3 = R & .6 \\
 \Delta V_{\text{الكلي}} &= IR_{\text{مكافئة}} = I(3R) = 3IR & \Delta V_{\text{الكلي}} &= 12 \text{ V} \\
 I &= \frac{\Delta V}{3R} \\
 \Delta V_1 = \Delta V_2 = \Delta V_3 &= IR = \left(\frac{\Delta V}{3R}\right)(R) = \frac{\Delta V}{3} = \boxed{4.0 \text{ V}}
 \end{aligned}$$

$$\begin{aligned}
 \Delta V_1 = \Delta V_2 = \Delta V_3 &= \Delta V_{\text{الكلي}} = \boxed{9.0 \text{ V}} & R_1 = R_2 = R_3 &= 3.0 \Omega & .7 \\
 \Delta V_{\text{الكلي}} &= 9.0 \text{ V}
 \end{aligned}$$

$$\begin{aligned}
 \Delta V_1 = \Delta V_2 = \Delta V_3 & & R_1 = R_2 = R_3 &= 3.0 \Omega & .8 \\
 \Delta V_{\text{الكلي}} &= 9.0 \text{ V} \\
 I_1 = \frac{\Delta V_1}{R_1} &= \frac{9.0}{3.0} = \boxed{3.0 \text{ A}} \\
 I_1 = I_2 = I_3 &= \boxed{3.0 \text{ A}}
 \end{aligned}$$

$$\begin{aligned}
 I &= 6I_1 = 6I_2 = 6I_3 = 6(3.0 \text{ A}) & R_1 = R_2 = R_3 &= 3.0 \Omega & .9 \\
 &= \boxed{18 \text{ A}} & \Delta V_{\text{الكلي}} &= 9.0 \text{ V}
 \end{aligned}$$

$$\begin{aligned}
 R_{\text{مكافئة}} &= 3.0 \Omega + \left(\frac{1}{1.5 \Omega} + \frac{1}{6.0 \Omega}\right)^{-1} = 3.0 \Omega + 1.2 \Omega = \boxed{4.2 \Omega} & .\text{أ} & R_1 = 1.5 \Omega & .14 \\
 & & & R_2 = 6.0 \Omega \\
 I &= \frac{\Delta V}{R_{\text{مكافئة}}} = \frac{12 \text{ V}}{4.2 \Omega} = \boxed{2.9 \text{ A}} & .\text{ب} & R_3 = 3.0 \Omega \\
 & & & \Delta V_{\text{الكلي}} = 12 \text{ V}
 \end{aligned}$$

$$\begin{aligned}
 R_{\text{مكافئة}} &= R_1 + R_2 = 16.0 \Omega & .\text{أ} & R_1 = 4.0 \Omega & .16 \\
 I_1 = I_2 = I &= \frac{\Delta V_{\text{الكلي}}}{R_{\text{مكافئة}}} = \frac{4.0 \text{ V}}{16.0 \Omega} = 0.25 \text{ A} & & R_2 = 12.0 \Omega \\
 \Delta V_1 &= IR_1 = 0.25 \text{ A} \times 4.0 \Omega = \boxed{1.0 \text{ V}} & & \Delta V_{\text{الكلي}} = 4.0 \text{ V} \\
 \Delta V_2 &= IR_2 = 0.25 \text{ A} \times 12.0 \Omega = \boxed{3.0 \text{ V}} \\
 \Delta V_1 &= \Delta V_2 = \boxed{4.0 \text{ V}} & .\text{ب} \\
 I_1 &= \frac{\Delta V_1}{R_1} = \frac{4.0 \text{ V}}{4 \Omega} = \boxed{1.0 \text{ A}} \\
 I_2 &= \frac{\Delta V_2}{R_2} = \frac{4.0 \text{ V}}{12 \Omega} = \boxed{0.33 \text{ A}}
 \end{aligned}$$

$$R_1 = 150 \, \Omega \quad 17.$$

$$R_2 = 180 \, \Omega$$

$$\Delta V_{\text{الكلية}} = 12 \, \text{V}$$

$$R_{\text{مكافئة}} = R_1 + R_2 = 330 \, \Omega \quad \text{أ.}$$

$$I = \frac{\Delta V_{\text{الكلية}}}{R_{\text{مكافئة}}} = \frac{12 \, \text{V}}{330 \, \Omega} = \boxed{0.036 \, \text{A}}$$

$$\Delta V_1 = IR_1 = 0.036 \, \text{A} \times 150 \, \Omega = \boxed{5.4 \, \text{V}}$$

$$\Delta V_2 = IR_2 = 0.036 \, \text{A} \times 180 \, \Omega = \boxed{6.5 \, \text{V}}$$

$$\Delta V_1 = \Delta V_2 = \Delta V = \boxed{12 \, \text{V}} \quad \text{ب.}$$

$$I_1 = \frac{\Delta V}{R_1} = \frac{12 \, \text{V}}{150 \, \Omega} = \boxed{0.080 \, \text{A}}$$

$$I_2 = \frac{\Delta V}{R_2} = \frac{12 \, \text{V}}{180 \, \Omega} = \boxed{0.067 \, \text{A}}$$

تطبيق 8 (أ)، ص 255

الحل

المعطى

$$B = \mu_0 \frac{I}{2\pi d} = \frac{(4\pi \times 10^{-7} \text{ T.m/A}) (10 \text{ A})}{(2\pi)(0.2 \text{ m})} = \boxed{1.0 \times 10^{-5} \text{ T}}$$

$$I = 10 \text{ A} \quad .1$$

$$d = 20 \text{ cm}$$

$$B = \mu_0 \frac{I}{2\pi d} = \frac{(4\pi \times 10^{-7} \text{ T.m/A}) (10 \text{ A})}{(2\pi)(0.1 \text{ m})} = \boxed{2 \times 10^{-5} \text{ T}}$$

$$I = 10 \text{ A} \quad .2$$

$$d = 0.1 \text{ m}$$

أ. $\vec{B}$ في اتجاه محور z الموجب

ب. $\vec{B}$ في اتجاه محور z السالب

$$B = \mu_0 \frac{I}{2\pi d} \quad ; \quad I = \frac{2\pi dB}{\mu_0}$$

$$d = 10 \text{ cm} \quad .3$$

$$B = 2 \times 10^{-5} \text{ T}$$

$$I = \frac{(2\pi)(0.1 \text{ m}) (2 \times 10^{-5} \text{ T})}{(4\pi \times 10^{-7} \text{ T.m/A})} = \boxed{10 \text{ A}}$$

تطبيق 8 (ب)، ص 257

$$B = \frac{\mu_0 NI}{2r} = \frac{(4\pi \times 10^{-7} \text{ T.m/A}) (10) (20 \text{ A})}{(2)(0.1)}$$

$$N = 10 \text{ لفات} \quad .1$$

$$r = 10 \text{ cm}$$

$$I = 20 \text{ A}$$

$$B = \boxed{1.3 \times 10^{-3} \text{ T}}$$

$$B = \frac{\mu_0 IN}{2r} \quad ; \quad I = \frac{2Br}{\mu_0 N}$$

$$D = 50 \text{ cm} \quad .2$$

$$B = 2\pi \times 10^{-5} \text{ T}$$

$$N = 1 \text{ لفة}$$

$$I = \frac{(2)(2\pi \times 10^{-5} \text{ T})(0.25 \text{ m})}{(4\pi \times 10^{-7} \text{ T.m/A})} = \boxed{25 \text{ A}}$$

$$B = \mu_0 \frac{NI}{2r} \quad ; \quad N = \frac{2Br}{\mu_0 I}$$

$$D = 20 \text{ cm} \quad .3$$

$$B = 2\pi \times 10^{-3} \text{ T}$$

$$I = 10 \text{ A}$$

$$N = \frac{(2)(2\pi \times 10^{-3} \text{ T})(0.1 \text{ m})}{(4\pi \times 10^{-7} \text{ T.m/A} \times 10 \text{ A})} = \boxed{100 \text{ لفة}}$$

تطبيق 8 (ج)، ص 259

$$B = \mu_0 \frac{N}{\ell} I = (4\pi \times 10^{-7} \text{ T.m/A})(1000 \text{ لفة})(5 \text{ A}) = \boxed{6.28 \times 10^{-3} \text{ T}}$$

$$\frac{N}{\ell} = 1000 \quad .1$$

$$I = 5 \text{ A}$$

$$\frac{N}{\ell} = \frac{2000 \text{ لفة}}{0.5 \text{ m}} = \boxed{4000 \text{ لفة/m}} \quad .أ$$

$$N = 2000 \text{ لفة} \quad .2$$

$$\ell = 50 \text{ cm}$$

$$I = 10 \text{ A}$$

$$B = \mu_0 \frac{N}{\ell} I = (4\pi \times 10^{-7} \text{ T.m/A}) \left(\frac{4000 \text{ لفة}}{\text{m}} \right) (10 \text{ A}) = \boxed{0.05 \text{ T}} \quad .ب$$

$$3. \text{ لفة } N = 1500$$

$$\ell = 100 \text{ cm}$$

$$B = 6\pi \times 10^{-3} \text{ T}$$

$$B = \mu_0 \frac{N}{\ell} I \quad ; \quad I = \frac{B\ell}{\mu_0 N}$$

$$I = \frac{(6\pi \times 10^{-3} \text{ T})(1 \text{ m})}{(4\pi \times 10^{-7} \text{ T.m/A})(1500)} = \boxed{10 \text{ A}}$$

تطبيق 8 (د)، ص 262

$$v = \frac{F_{\text{المغناطيسية}}}{qB} = \frac{2.40 \times 10^{-14} \text{ N}}{(1.60 \times 10^{-19} \text{ C})(4.20 \times 10^{-2} \text{ T})} = \boxed{3.57 \times 10^6 \text{ m/s}}$$

$$1. \quad B = 4.20 \times 10^{-2} \text{ T}$$

$$F_{\text{المغناطيسية}} = 2.40 \times 10^{-14} \text{ N}$$

$$q = 1.60 \times 10^{-19} \text{ C}$$

$$v = \frac{F_{\text{المغناطيسية}}}{qB} = \frac{2.0 \times 10^{-14} \text{ N}}{(1.60 \times 10^{-19} \text{ C})(8.3 \times 10^{-2} \text{ T})} = \boxed{1.5 \times 10^6 \text{ m/s}} \text{ نحو الشمال}$$

$$2. \quad F_{\text{المغناطيسية}} = 2.0 \times 10^{-14} \text{ N}$$

إلى أسفل

$$B = 8.3 \times 10^{-2} \text{ T} \text{ نحو الغرب}$$

$$q = 1.60 \times 10^{-19} \text{ C}$$

$$F_{\text{المغناطيسية}} = qvB = (1.60 \times 10^{-19} \text{ C})(2.5 \times 10^7 \text{ m/s})(1.5 \text{ T})$$

$$3. \quad B = 1.5 \text{ T} \text{ نحو الشمال}$$

$$F_{\text{المغناطيسية}} = \boxed{6.0 \times 10^{-12} \text{ m/s N}} \text{ نحو الغرب}$$

$$v = 2.5 \times 10^7 \text{ m/s} \text{ إلى أسفل}$$

$$q = 1.60 \times 10^{-19} \text{ C}$$

تطبيق 8 (هـ)، ص 265

$$B = \frac{F_{\text{المغناطيسية}}}{I\ell} = \frac{7.0 \times 10^{-6} \text{ N}}{(7.0 \text{ A})(6.0 \text{ m})} = \boxed{1.7 \times 10^{-7} \text{ T}} \text{ في اتجاه محور z الموجب}$$

$$1. \quad \ell = 6.0 \text{ m}$$

$$I = 7.0 \text{ A}$$

$$F_{\text{المغناطيسية}} = 7.0 \times 10^{-6} \text{ N}$$

$$B = \frac{F_{\text{المغناطيسية}}}{I\ell} = \frac{0.50 \text{ N}}{(10.0 \text{ A})(1.0 \text{ m})} = \boxed{0.050 \text{ T}}$$

$$2. \quad \ell = 1.0 \text{ m}$$

$$I = 10.0 \text{ A}$$

$$F_{\text{المغناطيسية}} = 0.50 \text{ N}$$

$$B = \frac{F_{\text{المغناطيسية}}}{I\ell} = \frac{1.0 \text{ N}}{(4.5 \text{ A})(0.15 \text{ m})} = \boxed{1.5 \text{ T}}$$

$$3. \quad \ell = 0.15 \text{ m}$$

$$I = 4.5 \text{ A}$$

$$F_{\text{المغناطيسية}} = 1.0 \text{ N}$$

$$\ell = \frac{F_{\text{المغناطيسية}}}{IB} = \frac{4.4 \text{ N}}{(5.0 \text{ A})(1.5 \text{ m})} = \boxed{0.59 \text{ m}}$$

$$4. \quad B = 1.5 \text{ T}$$

$$F_{\text{المغناطيسية}} = 4.4 \text{ N}$$

$$I = 5.0 \text{ A}$$