

Filter Summary Report: TIA,simple,Z4,ZL

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Contents

1 Examined $H(z)$ for TIA simple Z4 ZL: $\frac{Z_4 Z_L g_m}{Z_4 g_m + 2 Z_L g_m}$

$$H(z) = \frac{Z_4 Z_L g_m}{Z_4 g_m + 2 Z_L g_m}$$

2 HP

3 BP

3.1 BP-1 $Z(s) = \left(\infty, \infty, \infty, R_4, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$

$$H(s) = \frac{L_L R_4 s}{C_L L_L R_4 s^2 + 2 L_L s + R_4}$$

Parameters:

Q: $\frac{C_L R_4 \sqrt{\frac{1}{C_L L_L}}}{2}$
 wo: $\sqrt{\frac{1}{C_L L_L}}$
 bandwidth: $\frac{2}{C_L R_4}$
 K-LP: 0
 K-HP: 0
 K-BP: $\frac{R_4}{2}$
 Qz: 0
 Wz: None

3.2 BP-2 $Z(s) = \left(\infty, \infty, \infty, R_4, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$

$$H(s) = \frac{L_L R_4 R_L s}{C_L L_L R_4 R_L s^2 + L_L R_4 s + 2 L_L R_L s + R_4 R_L}$$

Parameters:

Q: $\frac{C_L R_4 R_L \sqrt{\frac{1}{C_L L_L}}}{R_4 + 2 R_L}$
 wo: $\sqrt{\frac{1}{C_L L_L}}$
 bandwidth: $\frac{R_4 + 2 R_L}{C_L R_4 R_L}$
 K-LP: 0
 K-HP: 0
 K-BP: $\frac{R_4 R_L}{R_4 + 2 R_L}$
 Qz: 0
 Wz: None

3.3 BP-3 $Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$

$$H(s) = \frac{L_L R_L s}{2 C_4 L_L R_L s^2 + C_L L_L R_L s^2 + L_L s + R_L}$$

Parameters:

Q: $R_L \sqrt{\frac{1}{L_L (2 C_4 + C_L)}} (2 C_4 + C_L)$
 wo: $\sqrt{\frac{1}{L_L (2 C_4 + C_L)}}$
 bandwidth: $\frac{1}{R_L (2 C_4 + C_L)}$
 K-LP: 0
 K-HP: 0
 K-BP: R_L
 Qz: 0

Wz: None

$$\mathbf{3.4 \quad BP-4} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

Parameters:

$$\begin{aligned} \text{Q: } & \frac{R_4 \sqrt{\frac{1}{L_L(2C_4+C_L)}}(2C_4+C_L)}{2} \\ \text{wo: } & \sqrt{\frac{1}{L_L(2C_4+C_L)}} \\ \text{bandwidth: } & \frac{2}{R_4(2C_4+C_L)} \\ \text{K-LP: } & 0 \\ \text{K-HP: } & 0 \\ \text{K-BP: } & \frac{R_4}{2} \\ \text{Qz: } & 0 \\ \text{Wz: } & \text{None} \end{aligned}$$

$$H(s) = \frac{L_L R_4 s}{2C_4 L_L R_4 s^2 + C_L L_L R_4 s^2 + 2L_L s + R_4}$$

$$\mathbf{3.5 \quad BP-5} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$$

Parameters:

$$\begin{aligned} \text{Q: } & \frac{R_4 R_L \sqrt{\frac{1}{L_L(2C_4+C_L)}}(2C_4+C_L)}{R_4 + 2R_L} \\ \text{wo: } & \sqrt{\frac{1}{L_L(2C_4+C_L)}} \\ \text{bandwidth: } & \frac{R_4 + 2R_L}{R_4 R_L(2C_4+C_L)} \\ \text{K-LP: } & 0 \\ \text{K-HP: } & 0 \\ \text{K-BP: } & \frac{R_4 R_L}{R_4 + 2R_L} \\ \text{Qz: } & 0 \\ \text{Wz: } & \text{None} \end{aligned}$$

$$H(s) = \frac{L_L R_4 R_L s}{2C_4 L_L R_4 R_L s^2 + C_L L_L R_4 R_L s^2 + L_L R_4 s + 2L_L R_L s + R_4 R_L}$$

$$\mathbf{3.6 \quad BP-6} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, R_L \right)$$

Parameters:

$$\begin{aligned} \text{Q: } & 2C_4 R_L \sqrt{\frac{1}{C_4 L_4}} \\ \text{wo: } & \sqrt{\frac{1}{C_4 L_4}} \\ \text{bandwidth: } & \frac{1}{2C_4 R_L} \\ \text{K-LP: } & 0 \\ \text{K-HP: } & 0 \\ \text{K-BP: } & R_L \\ \text{Qz: } & 0 \\ \text{Wz: } & \text{None} \end{aligned}$$

$$H(s) = \frac{L_4 R_L s}{2C_4 L_4 R_L s^2 + L_4 s + 2R_L}$$

$$\mathbf{3.7 \quad BP-7} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \frac{R_L}{C_L R_L s + 1} \right)$$

Parameters:

$$H(s) = \frac{L_4 R_L s}{2C_4 L_4 R_L s^2 + C_L L_4 R_L s^2 + L_4 s + 2R_L}$$

Q: $\sqrt{2}R_L\sqrt{\frac{1}{L_4(2C_4+C_L)}}(2C_4+C_L)$
 wo: $\sqrt{2}\sqrt{\frac{1}{L_4(2C_4+C_L)}}$
 bandwidth: $\frac{1}{R_L(2C_4+C_L)}$
 K-LP: 0
 K-HP: 0
 K-BP: R_L
 Qz: 0
 Wz: None

3.8 BP-8 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$

$$H(s) = \frac{L_4 L_L R_L s}{2C_4 L_4 L_L R_L s^2 + C_L L_4 L_L R_L s^2 + L_4 L_L s + L_4 R_L + 2L_L R_L}$$

Parameters:

Q: $R_L\sqrt{\frac{L_4+2L_L}{L_4 L_L(2C_4+C_L)}}(2C_4+C_L)$
 wo: $\sqrt{\frac{L_4+2L_L}{L_4 L_L(2C_4+C_L)}}$
 bandwidth: $\frac{1}{R_L(2C_4+C_L)}$
 K-LP: 0
 K-HP: 0
 K-BP: R_L
 Qz: 0
 Wz: None

3.9 BP-9 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, R_L \right)$

$$H(s) = \frac{L_4 R_4 R_L s}{2C_4 L_4 R_4 R_L s^2 + L_4 R_4 s + 2L_4 R_L s + 2R_4 R_L}$$

Parameters:

Q: $\frac{2C_4 R_4 R_L \sqrt{\frac{1}{C_4 L_4}}}{R_4 + 2R_L}$
 wo: $\sqrt{\frac{1}{C_4 L_4}}$
 bandwidth: $\frac{R_4 + 2R_L}{2C_4 R_4 R_L}$
 K-LP: 0
 K-HP: 0
 K-BP: $\frac{R_4 R_L}{R_4 + 2R_L}$
 Qz: 0
 Wz: None

3.10 BP-10 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \frac{1}{C_L s} \right)$

$$H(s) = \frac{L_4 R_4 s}{2C_4 L_4 R_4 s^2 + C_L L_4 R_4 s^2 + 2L_4 s + 2R_4}$$

Parameters:

Q: $\frac{\sqrt{2}R_4\sqrt{\frac{1}{L_4(2C_4+C_L)}}(2C_4+C_L)}{2}$
 wo: $\sqrt{2}\sqrt{\frac{1}{L_4(2C_4+C_L)}}$
 bandwidth: $\frac{2}{R_4(2C_4+C_L)}$
 K-LP: 0
 K-HP: 0
 K-BP: $\frac{R_4}{2}$
 Qz: 0
 Wz: None

3.11 BP-11 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \frac{R_L}{C_L R_L s + 1} \right)$

$$H(s) = \frac{L_4 R_4 R_L s}{2C_4 L_4 R_4 R_L s^2 + C_L L_4 R_4 R_L s^2 + L_4 R_4 s + 2L_4 R_L s + 2R_4 R_L}$$

Parameters:

Q: $\frac{\sqrt{2} R_4 R_L \sqrt{\frac{1}{L_4 (2C_4 + C_L)}} (2C_4 + C_L)}{R_4 + 2R_L}$
 wo: $\sqrt{2} \sqrt{\frac{1}{L_4 (2C_4 + C_L)}}$
 bandwidth: $\frac{R_4 + 2R_L}{R_4 R_L (2C_4 + C_L)}$
 K-LP: 0
 K-HP: 0
 K-BP: $\frac{R_4 R_L}{R_4 + 2R_L}$
 QZ: 0
 WZ: None

3.12 BP-12 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$

$$H(s) = \frac{L_4 L_L R_4 s}{2C_4 L_4 L_L R_4 s^2 + C_L L_4 L_L R_4 s^2 + 2L_4 L_L s + L_4 R_4 + 2L_L R_4}$$

Parameters:

Q: $\frac{R_4 \sqrt{\frac{L_4 + 2L_L}{L_4 L_L (2C_4 + C_L)}} (2C_4 + C_L)}{2}$
 wo: $\sqrt{\frac{L_4 + 2L_L}{L_4 L_L (2C_4 + C_L)}}$
 bandwidth: $\frac{2}{R_4 (2C_4 + C_L)}$
 K-LP: 0
 K-HP: 0
 K-BP: $\frac{R_4}{2}$
 QZ: 0
 WZ: None

3.13 BP-13 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 R_4 s}{C_4 L_4 R_4 s^2 + L_4 s + R_4}, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$

$$H(s) = \frac{L_4 L_L R_4 R_L s}{2C_4 L_4 L_L R_4 R_L s^2 + C_L L_4 L_L R_4 R_L s^2 + L_4 L_L R_4 s + 2L_4 L_L R_L s + L_4 R_4 R_L + 2L_L R_4 R_L}$$

Parameters:

Q: $\frac{R_4 R_L \sqrt{\frac{L_4 + 2L_L}{L_4 L_L (2C_4 + C_L)}} (2C_4 + C_L)}{R_4 + 2R_L}$
 wo: $\sqrt{\frac{L_4 + 2L_L}{L_4 L_L (2C_4 + C_L)}}$
 bandwidth: $\frac{R_4 + 2R_L}{R_4 R_L (2C_4 + C_L)}$
 K-LP: 0
 K-HP: 0
 K-BP: $\frac{R_4 R_L}{R_4 + 2R_L}$
 QZ: 0
 WZ: None

4 LP

5 BS

5.1 BS-1 $Z(s) = \left(\infty, \infty, \infty, R_4, \infty, L_L s + \frac{1}{C_L s} \right)$

Parameters:

Q: $\frac{2L_L \sqrt{\frac{1}{C_L L_L}}}{R_4}$
 wo: $\sqrt{\frac{1}{C_L L_L}}$
 bandwidth: $\frac{R_4}{2L_L}$
 K-LP: $\frac{R_4}{2}$
 K-HP: $\frac{R_4}{2}$
 K-BP: 0
 Qz: None
 Wz: $\sqrt{\frac{1}{C_L L_L}}$

$$H(s) = \frac{R_4 (C_L L_L s^2 + 1)}{2C_L L_L s^2 + C_L R_4 s + 2}$$

5.2 BS-2 $Z(s) = \left(\infty, \infty, \infty, R_4, \infty, \frac{R_L (C_L L_L s^2 + 1)}{C_L L_L s^2 + C_L R_L s + 1} \right)$

Parameters:

Q: $\frac{L_L \sqrt{\frac{1}{C_L L_L}} (R_4 + 2R_L)}{R_4 R_L}$
 wo: $\sqrt{\frac{1}{C_L L_L}}$
 bandwidth: $\frac{R_4 R_L}{L_L (R_4 + 2R_L)}$
 K-LP: $\frac{R_4 R_L}{R_4 + 2R_L}$
 K-HP: $\frac{R_4 R_L}{R_4 + 2R_L}$
 K-BP: 0
 Qz: None
 Wz: $\sqrt{\frac{1}{C_L L_L}}$

$$H(s) = \frac{R_4 R_L (C_L L_L s^2 + 1)}{C_L L_L R_4 s^2 + 2C_L L_L R_L s^2 + C_L R_4 R_L s + R_4 + 2R_L}$$

5.3 BS-3 $Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, R_L \right)$

Parameters:

Q: $\frac{L_4 \sqrt{\frac{1}{C_4 L_4}}}{2R_L}$
 wo: $\sqrt{\frac{1}{C_4 L_4}}$
 bandwidth: $\frac{2R_L}{L_4}$
 K-LP: R_L
 K-HP: R_L
 K-BP: 0
 Qz: None
 Wz: $\sqrt{\frac{1}{C_4 L_4}}$

$$H(s) = \frac{R_L (C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + 2C_4 R_L s + 1}$$

5.4 BS-4 $Z(s) = \left(\infty, \infty, \infty, \frac{R_4 (C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, R_L \right)$

Parameters:

$$H(s) = \frac{R_4 R_L (C_4 L_4 s^2 + 1)}{C_4 L_4 R_4 s^2 + 2C_4 L_4 R_L s^2 + 2C_4 R_4 R_L s + R_4 + 2R_L}$$

$$\begin{aligned}
\text{Q: } & \frac{L_4 \sqrt{\frac{1}{C_4 L_4}} (R_4 + 2R_L)}{2R_4 R_L} \\
\text{wo: } & \sqrt{\frac{1}{C_4 L_4}} \\
\text{bandwidth: } & \frac{2R_4 R_L}{L_4 (R_4 + 2R_L)} \\
\text{K-LP: } & \frac{R_4 R_L}{R_4 + 2R_L} \\
\text{K-HP: } & \frac{R_4 R_L}{R_4 + 2R_L} \\
\text{K-BP: } & 0 \\
\text{Qz: } & \text{None} \\
\text{Wz: } & \sqrt{\frac{1}{C_4 L_4}}
\end{aligned}$$

6 GE

$$\mathbf{6.1 \quad GE-1} \quad Z(s) = \left(\infty, \infty, \infty, R_4, \infty, L_L s + R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{R_4 (C_L L_L s^2 + C_L R_L s + 1)}{2C_L L_L s^2 + C_L R_4 s + 2C_L R_L s + 2}$$

Parameters:

$$\begin{aligned}
\text{Q: } & \frac{2L_L \sqrt{\frac{1}{C_L L_L}}}{R_4 + 2R_L} \\
\text{wo: } & \sqrt{\frac{1}{C_L L_L}} \\
\text{bandwidth: } & \frac{R_4 + 2R_L}{2L_L} \\
\text{K-LP: } & \frac{R_4}{2} \\
\text{K-HP: } & \frac{R_4}{2} \\
\text{K-BP: } & \frac{R_4 R_L}{R_4 + 2R_L} \\
\text{Qz: } & \frac{L_L \sqrt{\frac{1}{C_L L_L}}}{R_L} \\
\text{Wz: } & \sqrt{\frac{1}{C_L L_L}}
\end{aligned}$$

$$\mathbf{6.2 \quad GE-2} \quad Z(s) = \left(\infty, \infty, \infty, R_4, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

$$H(s) = \frac{R_4 (C_L L_L R_L s^2 + L_L s + R_L)}{C_L L_L R_4 s^2 + 2C_L L_L R_L s^2 + 2L_L s + R_4 + 2R_L}$$

Parameters:

$$\begin{aligned}
\text{Q: } & \frac{C_L \sqrt{\frac{1}{C_L L_L}} (R_4 + 2R_L)}{2} \\
\text{wo: } & \sqrt{\frac{1}{C_L L_L}} \\
\text{bandwidth: } & \frac{2}{C_L (R_4 + 2R_L)} \\
\text{K-LP: } & \frac{R_4 R_L}{R_4 + 2R_L} \\
\text{K-HP: } & \frac{R_4 R_L}{R_4 + 2R_L} \\
\text{K-BP: } & \frac{R_4}{2} \\
\text{Qz: } & C_L R_L \sqrt{\frac{1}{C_L L_L}} \\
\text{Wz: } & \sqrt{\frac{1}{C_L L_L}}
\end{aligned}$$

$$\mathbf{6.3 \quad GE-3} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, R_L \right)$$

$$H(s) = \frac{R_L (C_4 L_4 s^2 + C_4 R_4 s + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 2C_4 R_L s + 1}$$

Parameters:

$$\text{Q: } \frac{L_4 \sqrt{\frac{1}{C_4 L_4}}}{R_4 + 2R_L}$$

$$\begin{aligned}
&\text{wo: } \sqrt{\frac{1}{C_4 L_4}} \\
&\text{bandwidth: } \frac{R_4 + 2R_L}{L_4} \\
&\text{K-LP: } R_L \\
&\text{K-HP: } R_L \\
&\text{K-BP: } \frac{R_4 R_L}{R_4 + 2R_L} \\
&\text{Qz: } \frac{L_4 \sqrt{\frac{1}{C_4 L_4}}}{R_4} \\
&\text{Wz: } \sqrt{\frac{1}{C_4 L_4}}
\end{aligned}$$

6.4 GE-4 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, R_L \right)$

$$H(s) = \frac{R_L (C_4 L_4 R_4 s^2 + L_4 s + R_4)}{C_4 L_4 R_4 s^2 + 2C_4 L_4 R_L s^2 + L_4 s + R_4 + 2R_L}$$

Parameters:

$$\begin{aligned}
&\text{Q: } C_4 \sqrt{\frac{1}{C_4 L_4}} (R_4 + 2R_L) \\
&\text{wo: } \sqrt{\frac{1}{C_4 L_4}} \\
&\text{bandwidth: } \frac{1}{C_4 (R_4 + 2R_L)} \\
&\text{K-LP: } \frac{R_4 R_L}{R_4 + 2R_L} \\
&\text{K-HP: } \frac{R_4 R_L}{R_4 + 2R_L} \\
&\text{K-BP: } R_L \\
&\text{Qz: } C_4 R_4 \sqrt{\frac{1}{C_4 L_4}} \\
&\text{Wz: } \sqrt{\frac{1}{C_4 L_4}}
\end{aligned}$$

7 AP

8 INVALID-NUMER

8.1 INVALID-NUMER-1 $Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{R_4 (C_L R_L s + 1)}{2C_4 C_L R_4 R_L s^2 + 2C_4 R_4 s + C_L R_4 s + 2C_L R_L s + 2}$$

Parameters:

$$\begin{aligned}
&\text{Q: } \frac{2C_4 C_L R_4 R_L \sqrt{\frac{1}{C_4 C_L R_4 R_L}}}{2C_4 R_4 + C_L R_4 + 2C_L R_L} \\
&\text{wo: } \sqrt{\frac{1}{C_4 C_L R_4 R_L}} \\
&\text{bandwidth: } \frac{2C_4 R_4 + C_L R_4 + 2C_L R_L}{2C_4 C_L R_4 R_L} \\
&\text{K-LP: } \frac{R_4}{2} \\
&\text{K-HP: } 0 \\
&\text{K-BP: } \frac{C_L R_4 R_L}{2C_4 R_4 + C_L R_4 + 2C_L R_L} \\
&\text{Qz: } 0 \\
&\text{Wz: None}
\end{aligned}$$

8.2 INVALID-NUMER-2 $Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, \frac{R_L}{C_L R_L s + 1} \right)$

$$H(s) = \frac{R_L (C_4 R_4 s + 1)}{C_4 C_L R_4 R_L s^2 + C_4 R_4 s + 2C_4 R_L s + C_L R_L s + 1}$$

Parameters:

$$\text{Q: } \frac{C_4 C_L R_4 R_L \sqrt{\frac{1}{C_4 C_L R_4 R_L}}}{C_4 R_4 + 2C_4 R_L + C_L R_L}$$

wo: $\sqrt{\frac{1}{C_4 C_L R_4 R_L}}$
 bandwidth: $\frac{C_4 R_4 + 2C_4 R_L + C_L R_L}{C_4 C_L R_4 R_L}$
 K-LP: R_L
 K-HP: 0
 K-BP: $\frac{C_4 R_4 R_L}{C_4 R_4 + 2C_4 R_L + C_L R_L}$
 Qz: 0
 Wz: None

9 INVALID-WZ

10 INVALID-ORDER

10.1 INVALID-ORDER-1 $Z(s) = (\infty, \infty, \infty, R_4, \infty, R_L)$

$$H(s) = \frac{R_4 R_L}{R_4 + 2R_L}$$

10.2 INVALID-ORDER-2 $Z(s) = \left(\infty, \infty, \infty, R_4, \infty, \frac{1}{C_L s}\right)$

$$H(s) = \frac{R_4}{C_L R_4 s + 2}$$

10.3 INVALID-ORDER-3 $Z(s) = \left(\infty, \infty, \infty, R_4, \infty, \frac{R_L}{C_L R_L s + 1}\right)$

$$H(s) = \frac{R_4 R_L}{C_L R_4 R_L s + R_4 + 2R_L}$$

10.4 INVALID-ORDER-4 $Z(s) = \left(\infty, \infty, \infty, R_4, \infty, R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{R_4 (C_L R_L s + 1)}{C_L R_4 s + 2C_L R_L s + 2}$$

10.5 INVALID-ORDER-5 $Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, R_L\right)$

$$H(s) = \frac{R_L}{2C_4 R_L s + 1}$$

10.6 INVALID-ORDER-6 $Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, \frac{1}{C_L s}\right)$

$$H(s) = \frac{1}{s(2C_4 + C_L)}$$

10.7 INVALID-ORDER-7 $Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, \frac{R_L}{C_L R_L s + 1}\right)$

$$H(s) = \frac{R_L}{2C_4 R_L s + C_L R_L s + 1}$$

$$10.8 \quad \text{INVALID-ORDER-8} \quad Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{C_L R_L s + 1}{s(2C_4 C_L R_L s + 2C_4 + C_L)}$$

$$10.9 \quad \text{INVALID-ORDER-9} \quad Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, L_L s + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{C_L L_L s^2 + 1}{s(2C_4 C_L L_L s^2 + 2C_4 + C_L)}$$

$$10.10 \quad \text{INVALID-ORDER-10} \quad Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

$$H(s) = \frac{L_L s}{2C_4 L_L s^2 + C_L L_L s^2 + 1}$$

$$10.11 \quad \text{INVALID-ORDER-11} \quad Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, L_L s + R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{C_L L_L s^2 + C_L R_L s + 1}{s(2C_4 C_L L_L s^2 + 2C_4 C_L R_L s + 2C_4 + C_L)}$$

$$10.12 \quad \text{INVALID-ORDER-12} \quad Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

$$H(s) = \frac{C_L L_L R_L s^2 + L_L s + R_L}{2C_4 C_L L_L R_L s^3 + 2C_4 L_L s^2 + 2C_4 R_L s + C_L L_L s^2 + 1}$$

$$10.13 \quad \text{INVALID-ORDER-13} \quad Z(s) = \left(\infty, \infty, \infty, \frac{1}{C_4 s}, \infty, \frac{R_L (C_L L_L s^2 + 1)}{C_L L_L s^2 + C_L R_L s + 1} \right)$$

$$H(s) = \frac{R_L (C_L L_L s^2 + 1)}{2C_4 C_L L_L R_L s^3 + 2C_4 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

$$10.14 \quad \text{INVALID-ORDER-14} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, R_L \right)$$

$$H(s) = \frac{R_4 R_L}{2C_4 R_4 R_L s + R_4 + 2R_L}$$

$$10.15 \quad \text{INVALID-ORDER-15} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, \frac{1}{C_L s} \right)$$

$$H(s) = \frac{R_4}{2C_4 R_4 s + C_L R_4 s + 2}$$

$$10.16 \quad \text{INVALID-ORDER-16} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, \frac{R_L}{C_L R_L s + 1} \right)$$

$$H(s) = \frac{R_4 R_L}{2C_4 R_4 R_L s + C_L R_4 R_L s + R_4 + 2R_L}$$

$$10.17 \quad \text{INVALID-ORDER-17} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, L_L s + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{R_4 (C_L L_L s^2 + 1)}{2C_4 C_L L_L R_4 s^3 + 2C_4 R_4 s + 2C_L L_L s^2 + C_L R_4 s + 2}$$

$$10.18 \quad \text{INVALID-ORDER-18} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, L_L s + R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{R_4 (C_L L_L s^2 + C_L R_L s + 1)}{2C_4 C_L L_L R_4 s^3 + 2C_4 C_L R_4 R_L s^2 + 2C_4 R_4 s + 2C_L L_L s^2 + C_L R_4 s + 2C_L R_L s + 2}$$

$$10.19 \quad \text{INVALID-ORDER-19} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

$$H(s) = \frac{R_4 (C_L L_L R_L s^2 + L_L s + R_L)}{2C_4 C_L L_L R_4 R_L s^3 + 2C_4 L_L R_4 s^2 + 2C_4 R_4 R_L s + C_L L_L R_4 s^2 + 2C_L L_L R_L s^2 + 2L_L s + R_4 + 2R_L}$$

$$10.20 \quad \text{INVALID-ORDER-20} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4}{C_4 R_4 s + 1}, \infty, \frac{R_L (C_L L_L s^2 + 1)}{C_L L_L s^2 + C_L R_L s + 1} \right)$$

$$H(s) = \frac{R_4 R_L (C_L L_L s^2 + 1)}{2C_4 C_L L_L R_4 R_L s^3 + 2C_4 R_4 R_L s + C_L L_L R_4 s^2 + 2C_L L_L R_L s^2 + C_L R_4 R_L s + R_4 + 2R_L}$$

$$10.21 \quad \text{INVALID-ORDER-21} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, R_L \right)$$

$$H(s) = \frac{R_L (C_4 R_4 s + 1)}{C_4 R_4 s + 2C_4 R_L s + 1}$$

$$10.22 \quad \text{INVALID-ORDER-22} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, \frac{1}{C_L s} \right)$$

$$H(s) = \frac{C_4 R_4 s + 1}{s (C_4 C_L R_4 s + 2C_4 + C_L)}$$

$$10.23 \quad \text{INVALID-ORDER-23} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_4 R_4 s + 1) (C_L R_L s + 1)}{s (C_4 C_L R_4 s + 2C_4 C_L R_L s + 2C_4 + C_L)}$$

$$10.24 \quad \text{INVALID-ORDER-24} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, L_L s + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_4 R_4 s + 1) (C_L L_L s^2 + 1)}{s (2C_4 C_L L_L s^2 + C_4 C_L R_4 s + 2C_4 + C_L)}$$

$$10.25 \quad \text{INVALID-ORDER-25} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

$$H(s) = \frac{L_L s (C_4 R_4 s + 1)}{C_4 C_L L_L R_4 s^3 + 2C_4 L_L s^2 + C_4 R_4 s + C_L L_L s^2 + 1}$$

$$10.26 \quad \text{INVALID-ORDER-26} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, L_L s + R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_4 R_4 s + 1) (C_L L_L s^2 + C_L R_L s + 1)}{s (2C_4 C_L L_L s^2 + C_4 C_L R_4 s + 2C_4 C_L R_L s + 2C_4 + C_L)}$$

$$10.27 \quad \text{INVALID-ORDER-27} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$$

$$H(s) = \frac{L_L R_L s (C_4 R_4 s + 1)}{C_4 C_L L_L R_4 R_L s^3 + C_4 L_L R_4 s^2 + 2C_4 L_L R_L s^2 + C_4 R_4 R_L s + C_L L_L R_L s^2 + L_L s + R_L}$$

$$10.28 \quad \text{INVALID-ORDER-28} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

$$H(s) = \frac{(C_4 R_4 s + 1) (C_L L_L R_L s^2 + L_L s + R_L)}{C_4 C_L L_L R_4 s^3 + 2C_4 C_L L_L R_L s^3 + 2C_4 L_L s^2 + C_4 R_4 s + 2C_4 R_L s + C_L L_L s^2 + 1}$$

$$10.29 \quad \text{INVALID-ORDER-29} \quad Z(s) = \left(\infty, \infty, \infty, R_4 + \frac{1}{C_4 s}, \infty, \frac{R_L (C_L L_L s^2 + 1)}{C_L L_L s^2 + C_L R_L s + 1} \right)$$

$$H(s) = \frac{R_L (C_4 R_4 s + 1) (C_L L_L s^2 + 1)}{C_4 C_L L_L R_4 s^3 + 2C_4 C_L L_L R_L s^3 + C_4 C_L R_4 R_L s^2 + C_4 R_4 s + 2C_4 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

$$10.30 \quad \text{INVALID-ORDER-30} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, \frac{1}{C_L s} \right)$$

$$H(s) = \frac{C_4 L_4 s^2 + 1}{s (C_4 C_L L_4 s^2 + 2C_4 + C_L)}$$

$$10.31 \quad \text{INVALID-ORDER-31} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, \frac{R_L}{C_L R_L s + 1} \right)$$

$$H(s) = \frac{R_L (C_4 L_4 s^2 + 1)}{C_4 C_L L_4 R_L s^3 + C_4 L_4 s^2 + 2C_4 R_L s + C_L R_L s + 1}$$

$$10.32 \quad \text{INVALID-ORDER-32} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_4 L_4 s^2 + 1) (C_L R_L s + 1)}{s (C_4 C_L L_4 s^2 + 2C_4 C_L R_L s + 2C_4 + C_L)}$$

$$10.33 \quad \text{INVALID-ORDER-33} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, L_L s + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_4 L_4 s^2 + 1) (C_L L_L s^2 + 1)}{s (C_4 C_L L_4 s^2 + 2C_4 C_L L_L s^2 + 2C_4 + C_L)}$$

$$10.34 \quad \text{INVALID-ORDER-34} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

$$H(s) = \frac{L_L s (C_4 L_4 s^2 + 1)}{C_4 C_L L_4 L_L s^4 + C_4 L_4 s^2 + 2C_4 L_L s^2 + C_L L_L s^2 + 1}$$

$$10.35 \quad \text{INVALID-ORDER-35} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, L_L s + R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_4 L_4 s^2 + 1) (C_L L_L s^2 + C_L R_L s + 1)}{s (C_4 C_L L_4 s^2 + 2C_4 C_L L_L s^2 + 2C_4 C_L R_L s + 2C_4 + C_L)}$$

$$10.36 \quad \text{INVALID-ORDER-36} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$$

$$H(s) = \frac{L_L R_L s (C_4 L_4 s^2 + 1)}{C_4 C_L L_4 L_L R_L s^4 + C_4 L_4 L_L s^3 + C_4 L_4 R_L s^2 + 2 C_4 L_L R_L s^2 + C_L L_L R_L s^2 + L_L s + R_L}$$

$$10.37 \quad \text{INVALID-ORDER-37} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

$$H(s) = \frac{(C_4 L_4 s^2 + 1) (C_L L_L R_L s^2 + L_L s + R_L)}{C_4 C_L L_4 L_L s^4 + 2 C_4 C_L L_L R_L s^3 + C_4 L_4 s^2 + 2 C_4 L_L s^2 + 2 C_4 R_L s + C_L L_L s^2 + 1}$$

$$10.38 \quad \text{INVALID-ORDER-38} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + \frac{1}{C_4 s}, \infty, \frac{R_L (C_L L_L s^2 + 1)}{C_L L_L s^2 + C_L R_L s + 1} \right)$$

$$H(s) = \frac{R_L (C_4 L_4 s^2 + 1) (C_L L_L s^2 + 1)}{C_4 C_L L_4 L_L s^4 + C_4 C_L L_4 R_L s^3 + 2 C_4 C_L L_L R_L s^3 + C_4 L_4 s^2 + 2 C_4 R_L s + C_L L_L s^2 + C_L R_L s + 1}$$

$$10.39 \quad \text{INVALID-ORDER-39} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \frac{1}{C_L s} \right)$$

$$H(s) = \frac{L_4 s}{2 C_4 L_4 s^2 + C_L L_4 s^2 + 2}$$

$$10.40 \quad \text{INVALID-ORDER-40} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{L_4 s (C_L R_L s + 1)}{2 C_4 C_L L_4 R_L s^3 + 2 C_4 L_4 s^2 + C_L L_4 s^2 + 2 C_L R_L s + 2}$$

$$10.41 \quad \text{INVALID-ORDER-41} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, L_L s + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{L_4 s (C_L L_L s^2 + 1)}{2 C_4 C_L L_4 L_L s^4 + 2 C_4 L_4 s^2 + C_L L_4 s^2 + 2 C_L L_L s^2 + 2}$$

$$10.42 \quad \text{INVALID-ORDER-42} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

$$H(s) = \frac{L_4 L_L s}{2 C_4 L_4 L_L s^2 + C_L L_4 L_L s^2 + L_4 + 2 L_L}$$

$$10.43 \quad \text{INVALID-ORDER-43} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, L_L s + R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{L_4 s (C_L L_L s^2 + C_L R_L s + 1)}{2 C_4 C_L L_4 L_L s^4 + 2 C_4 C_L L_4 R_L s^3 + 2 C_4 L_4 s^2 + C_L L_4 s^2 + 2 C_L L_L s^2 + 2 C_L R_L s + 2}$$

$$10.44 \quad \text{INVALID-ORDER-44} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

$$H(s) = \frac{L_4 s (C_L L_L R_L s^2 + L_L s + R_L)}{2 C_4 C_L L_4 L_L R_L s^4 + 2 C_4 L_4 L_L s^3 + 2 C_4 L_4 R_L s^2 + C_L L_4 L_L s^3 + 2 C_L L_L R_L s^2 + L_4 s + 2 L_L s + 2 R_L}$$

$$10.45 \quad \text{INVALID-ORDER-45} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1}, \infty, \frac{R_L (C_L L_L s^2 + 1)}{C_L L_L s^2 + C_L R_L s + 1} \right)$$

$$H(s) = \frac{L_4 R_L s (C_L L_L s^2 + 1)}{2C_4 C_L L_4 L_L R_L s^4 + 2C_4 L_4 R_L s^2 + C_L L_4 L_L s^3 + C_L L_4 R_L s^2 + 2C_L L_L R_L s^2 + L_4 s + 2R_L}$$

$$10.46 \quad \text{INVALID-ORDER-46} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \frac{1}{C_L s} \right)$$

$$H(s) = \frac{C_4 L_4 s^2 + C_4 R_4 s + 1}{s (C_4 C_L L_4 s^2 + C_4 C_L R_4 s + 2C_4 + C_L)}$$

$$10.47 \quad \text{INVALID-ORDER-47} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \frac{R_L}{C_L R_L s + 1} \right)$$

$$H(s) = \frac{R_L (C_4 L_4 s^2 + C_4 R_4 s + 1)}{C_4 C_L L_4 R_L s^3 + C_4 C_L R_4 R_L s^2 + C_4 L_4 s^2 + C_4 R_4 s + 2C_4 R_L s + C_L R_L s + 1}$$

$$10.48 \quad \text{INVALID-ORDER-48} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_L R_L s + 1) (C_4 L_4 s^2 + C_4 R_4 s + 1)}{s (C_4 C_L L_4 s^2 + C_4 C_L R_4 s + 2C_4 C_L R_L s + 2C_4 + C_L)}$$

$$10.49 \quad \text{INVALID-ORDER-49} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, L_L s + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_L L_L s^2 + 1) (C_4 L_4 s^2 + C_4 R_4 s + 1)}{s (C_4 C_L L_4 s^2 + 2C_4 C_L L_L s^2 + C_4 C_L R_4 s + 2C_4 + C_L)}$$

$$10.50 \quad \text{INVALID-ORDER-50} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$$

$$H(s) = \frac{L_L s (C_4 L_4 s^2 + C_4 R_4 s + 1)}{C_4 C_L L_4 L_L s^4 + C_4 C_L L_L R_4 s^3 + C_4 L_4 s^2 + 2C_4 L_L s^2 + C_4 R_4 s + C_L L_L s^2 + 1}$$

$$10.51 \quad \text{INVALID-ORDER-51} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, L_L s + R_L + \frac{1}{C_L s} \right)$$

$$H(s) = \frac{(C_4 L_4 s^2 + C_4 R_4 s + 1) (C_L L_L s^2 + C_L R_L s + 1)}{s (C_4 C_L L_4 s^2 + 2C_4 C_L L_L s^2 + C_4 C_L R_4 s + 2C_4 C_L R_L s + 2C_4 + C_L)}$$

$$10.52 \quad \text{INVALID-ORDER-52} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$$

$$H(s) = \frac{L_L R_L s (C_4 L_4 s^2 + C_4 R_4 s + 1)}{C_4 C_L L_4 L_L R_L s^4 + C_4 C_L L_L R_4 R_L s^3 + C_4 L_4 L_L s^3 + C_4 L_4 R_L s^2 + C_4 L_L R_4 s^2 + 2C_4 L_L R_L s^2 + C_4 R_4 R_L s + C_L L_L R_L s^2 + L_L s + R_L}$$

$$10.53 \quad \text{INVALID-ORDER-53} \quad Z(s) = \left(\infty, \infty, \infty, L_4 s + R_4 + \frac{1}{C_4 s}, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$$

$$H(s) = \frac{(C_4 L_4 s^2 + C_4 R_4 s + 1) (C_L L_L R_L s^2 + L_L s + R_L)}{C_4 C_L L_4 L_L s^4 + C_4 C_L L_L R_4 s^3 + 2C_4 C_L L_L R_L s^3 + C_4 L_4 s^2 + 2C_4 L_L s^2 + C_4 R_4 s + 2C_4 R_L s + C_L L_L s^2 + 1}$$

$$10.54 \quad \text{INVALID-ORDER-54} \quad Z(s) = \left(\infty, \infty, \infty, L_4s + R_4 + \frac{1}{C_4s}, \infty, \frac{R_L(C_LL_Ls^2+1)}{C_LL_Ls^2+C_LR_Ls+1} \right)$$

$$H(s) = \frac{R_L(C_LL_Ls^2+1)(C_4L_4s^2+C_4R_4s+1)}{C_4C_LL_4L_Ls^4+C_4C_LL_4R_Ls^3+C_4C_LL_LR_4s^3+2C_4C_LL_LR_Ls^3+C_4C_LR_4R_Ls^2+C_4L_4s^2+C_4R_4s+2C_4R_Ls+C_LL_Ls^2+C_LR_Ls+1}$$

$$10.55 \quad \text{INVALID-ORDER-55} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, R_L + \frac{1}{C_Ls} \right)$$

$$H(s) = \frac{L_4R_4s(C_LR_Ls+1)}{2C_4C_LL_4R_4R_Ls^3+2C_4L_4R_4s^2+C_LL_4R_4s^2+2C_LL_4R_Ls^2+2C_LR_4R_Ls+2L_4s+2R_4}$$

$$10.56 \quad \text{INVALID-ORDER-56} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, L_Ls + \frac{1}{C_Ls} \right)$$

$$H(s) = \frac{L_4R_4s(C_LL_Ls^2+1)}{2C_4C_LL_4L_LR_4s^4+2C_4L_4R_4s^2+2C_LL_4L_Ls^3+C_LL_4R_4s^2+2C_LL_LR_4s^2+2L_4s+2R_4}$$

$$10.57 \quad \text{INVALID-ORDER-57} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, L_Ls + R_L + \frac{1}{C_Ls} \right)$$

$$H(s) = \frac{L_4R_4s(C_LL_Ls^2+C_LR_Ls+1)}{2C_4C_LL_4L_LR_4s^4+2C_4C_LL_4R_4R_Ls^3+2C_4L_4R_4s^2+2C_LL_4L_Ls^3+C_LL_4R_4s^2+2C_LL_LR_Ls^2+2C_LL_LR_4s^2+2C_LR_4R_Ls+2L_4s+2R_4}$$

$$10.58 \quad \text{INVALID-ORDER-58} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_L \right)$$

$$H(s) = \frac{L_4R_4s(C_LL_LR_Ls^2+L_Ls+R_L)}{2C_4C_LL_4L_LR_4R_Ls^4+2C_4L_4L_LR_4s^3+2C_4L_4R_4R_Ls^2+C_LL_4L_LR_4s^3+2C_LL_4L_LR_Ls^3+2C_LL_LR_4R_Ls^2+2L_4L_Ls^2+L_4R_4s+2L_4R_Ls+2L_LR_4s+2R_4R_L}$$

$$10.59 \quad \text{INVALID-ORDER-59} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4R_4s}{C_4L_4R_4s^2+L_4s+R_4}, \infty, \frac{R_L(C_LL_Ls^2+1)}{C_LL_Ls^2+C_LR_Ls+1} \right)$$

$$H(s) = \frac{L_4R_4R_Ls(C_LL_Ls^2+1)}{2C_4C_LL_4L_LR_4R_Ls^4+2C_4L_4R_4R_Ls^2+C_LL_4L_LR_4s^3+2C_LL_4L_LR_Ls^3+C_LL_4R_4R_Ls^2+2C_LL_LR_4R_Ls^2+L_4R_4s+2L_4R_Ls+2R_4R_L}$$

$$10.60 \quad \text{INVALID-ORDER-60} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, \frac{1}{C_Ls} \right)$$

$$H(s) = \frac{C_4L_4R_4s^2+L_4s+R_4}{C_4C_LL_4R_4s^3+2C_4L_4s^2+C_LL_4s^2+C_LR_4s+2}$$

$$10.61 \quad \text{INVALID-ORDER-61} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, \frac{R_L}{C_LR_Ls+1} \right)$$

$$H(s) = \frac{R_L(C_4L_4R_4s^2+L_4s+R_4)}{C_4C_LL_4R_4R_Ls^3+C_4L_4R_4s^2+2C_4L_4R_Ls^2+C_LL_4R_Ls^2+C_LR_4R_Ls+L_4s+R_4+2R_L}$$

$$10.62 \quad \text{INVALID-ORDER-62} \quad Z(s) = \left(\infty, \infty, \infty, \frac{L_4s}{C_4L_4s^2+1} + R_4, \infty, R_L + \frac{1}{C_Ls} \right)$$

$$H(s) = \frac{(C_LR_Ls+1)(C_4L_4R_4s^2+L_4s+R_4)}{C_4C_LL_4R_4s^3+2C_4C_LL_4R_Ls^3+2C_4L_4s^2+C_LL_4s^2+C_LR_4s+2C_LR_Ls+2}$$

10.63 INVALID-ORDER-63 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, L_L s + \frac{1}{C_L s} \right)$

$$H(s) = \frac{(C_L L_L s^2 + 1) (C_4 L_4 R_4 s^2 + L_4 s + R_4)}{2 C_4 C_L L_4 L_L s^4 + C_4 C_L L_4 R_4 s^3 + 2 C_4 L_4 s^2 + C_L L_4 s^2 + 2 C_L L_L s^2 + C_L R_4 s + 2}$$

10.64 INVALID-ORDER-64 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, \frac{L_L s}{C_L L_L s^2 + 1} \right)$

$$H(s) = \frac{L_L s (C_4 L_4 R_4 s^2 + L_4 s + R_4)}{C_4 C_L L_4 L_L R_4 s^4 + 2 C_4 L_4 L_L s^3 + C_4 L_4 R_4 s^2 + C_L L_4 L_L s^3 + C_L L_L R_4 s^2 + L_4 s + 2 L_L s + R_4}$$

10.65 INVALID-ORDER-65 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, L_L s + R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{(C_L L_L s^2 + C_L R_L s + 1) (C_4 L_4 R_4 s^2 + L_4 s + R_4)}{2 C_4 C_L L_4 L_L s^4 + C_4 C_L L_4 R_4 s^3 + 2 C_4 C_L L_4 R_L s^3 + 2 C_4 L_4 s^2 + C_L L_4 s^2 + 2 C_L L_L s^2 + C_L R_4 s + 2 C_L R_L s + 2}$$

10.66 INVALID-ORDER-66 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, \frac{L_L R_L s}{C_L L_L R_L s^2 + L_L s + R_L} \right)$

$$H(s) = \frac{L_L R_L s (C_4 L_4 R_4 s^2 + L_4 s + R_4)}{C_4 C_L L_4 L_L R_4 R_L s^4 + C_4 L_4 L_L R_4 s^3 + 2 C_4 L_4 L_L R_L s^3 + C_4 L_4 R_4 R_L s^2 + C_L L_4 L_L R_L s^3 + C_L L_L R_4 R_L s^2 + L_4 L_L s^2 + L_4 R_L s + L_L R_4 s + 2 L_L R_L s + R_4 R_L}$$

10.67 INVALID-ORDER-67 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, \frac{L_L s}{C_L L_L s^2 + 1} + R_L \right)$

$$H(s) = \frac{(C_4 L_4 R_4 s^2 + L_4 s + R_4) (C_L L_L R_L s^2 + L_L s + R_L)}{C_4 C_L L_4 L_L R_4 s^4 + 2 C_4 C_L L_4 L_L R_L s^4 + 2 C_4 L_4 L_L s^3 + C_4 L_4 R_4 s^2 + 2 C_4 L_4 R_L s^2 + C_L L_4 L_L s^3 + C_L L_L R_4 s^2 + 2 C_L L_L R_L s^2 + L_4 s + 2 L_L s + R_4 + 2 R_L}$$

10.68 INVALID-ORDER-68 $Z(s) = \left(\infty, \infty, \infty, \frac{L_4 s}{C_4 L_4 s^2 + 1} + R_4, \infty, \frac{R_L (C_L L_L s^2 + 1)}{C_L L_L s^2 + C_L R_L s + 1} \right)$

$$H(s) = \frac{R_L (C_L L_L s^2 + 1) (C_4 L_4 R_4 s^2 + L_4 s + R_4)}{C_4 C_L L_4 L_L R_4 s^4 + 2 C_4 C_L L_4 L_L R_L s^4 + C_4 C_L L_4 R_4 R_L s^3 + C_4 L_4 R_4 s^2 + 2 C_4 L_4 R_L s^2 + C_L L_4 L_L s^3 + C_L L_4 R_L s^2 + C_L L_L R_4 s^2 + 2 C_L L_L R_L s^2 + C_L R_4 R_L s + L_4 s + R_4 + 2 R_L}$$

10.69 INVALID-ORDER-69 $Z(s) = \left(\infty, \infty, \infty, \frac{R_4 (C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \frac{1}{C_L s} \right)$

$$H(s) = \frac{R_4 (C_4 L_4 s^2 + 1)}{C_4 C_L L_4 R_4 s^3 + 2 C_4 L_4 s^2 + 2 C_4 R_4 s + C_L R_4 s + 2}$$

10.70 INVALID-ORDER-70 $Z(s) = \left(\infty, \infty, \infty, \frac{R_4 (C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, \frac{R_L}{C_L R_L s + 1} \right)$

$$H(s) = \frac{R_4 R_L (C_4 L_4 s^2 + 1)}{C_4 C_L L_4 R_4 R_L s^3 + C_4 L_4 R_4 s^2 + 2 C_4 L_4 R_L s^2 + 2 C_4 R_4 R_L s + C_L R_4 R_L s + R_4 + 2 R_L}$$

10.71 INVALID-ORDER-71 $Z(s) = \left(\infty, \infty, \infty, \frac{R_4 (C_4 L_4 s^2 + 1)}{C_4 L_4 s^2 + C_4 R_4 s + 1}, \infty, R_L + \frac{1}{C_L s} \right)$

$$H(s) = \frac{R_4 (C_4 L_4 s^2 + 1) (C_L R_L s + 1)}{C_4 C_L L_4 R_4 s^3 + 2 C_4 C_L L_4 R_L s^3 + 2 C_4 C_L R_4 R_L s^2 + 2 C_4 L_4 s^2 + 2 C_4 R_4 s + C_L R_4 s + 2 C_L R_L s + 2}$$

$$\mathbf{10.72 \quad INVALID-ORDER-72} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, L_Ls + \frac{1}{C_Ls} \right)$$

$$H(s) = \frac{R_4(C_4L_4s^2+1)(C_LL_Ls^2+1)}{2C_4C_LL_LR_4s^4 + C_4C_LL_LR_4s^3 + 2C_4C_LL_LR_4s^3 + 2C_4L_4s^2 + 2C_4R_4s + 2C_LL_Ls^2 + C_LR_4s + 2}$$

$$\mathbf{10.73 \quad INVALID-ORDER-73} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \frac{L_Ls}{C_LL_Ls^2+1} \right)$$

$$H(s) = \frac{L_LR_4s(C_4L_4s^2+1)}{C_4C_LL_LR_4s^4 + 2C_4L_4L_Ls^3 + C_4L_4R_4s^2 + 2C_4L_LR_4s^2 + C_LL_LR_4s^2 + 2L_Ls + R_4}$$

$$\mathbf{10.74 \quad INVALID-ORDER-74} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, L_Ls + R_L + \frac{1}{C_Ls} \right)$$

$$H(s) = \frac{R_4(C_4L_4s^2+1)(C_LL_Ls^2 + C_LR_Ls + 1)}{2C_4C_LL_LR_4s^4 + C_4C_LL_LR_4s^3 + 2C_4C_LL_LR_Ls^3 + 2C_4C_LL_LR_4s^3 + 2C_4C_LR_4R_Ls^2 + 2C_4L_4s^2 + 2C_4R_4s + 2C_LL_Ls^2 + C_LR_4s + 2C_LR_Ls + 2}$$

$$\mathbf{10.75 \quad INVALID-ORDER-75} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \frac{L_LR_Ls}{C_LL_LR_Ls^2+L_Ls+R_L} \right)$$

$$H(s) = \frac{L_LR_4R_Ls(C_4L_4s^2+1)}{C_4C_LL_LR_4R_Ls^4 + C_4L_4L_LR_4s^3 + 2C_4L_4L_LR_Ls^3 + C_4L_4R_4R_Ls^2 + 2C_4L_LR_4R_Ls^2 + C_LL_LR_4R_Ls^2 + L_LR_4s + 2L_LR_Ls + R_4R_L}$$

$$\mathbf{10.76 \quad INVALID-ORDER-76} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \frac{L_Ls}{C_LL_Ls^2+1} + R_L \right)$$

$$H(s) = \frac{R_4(C_4L_4s^2+1)(C_LL_LR_Ls^2 + L_Ls + R_L)}{C_4C_LL_LR_4s^4 + 2C_4C_LL_LR_LR_Ls^4 + 2C_4C_LL_LR_4R_Ls^3 + 2C_4L_4L_Ls^3 + C_4L_4R_4s^2 + 2C_4L_LR_4s^2 + 2C_4L_LR_4s^2 + 2C_4R_4R_Ls + C_LL_LR_4s^2 + 2C_LL_LR_Ls^2 + 2L_Ls + R_4 + 2R_L}$$

$$\mathbf{10.77 \quad INVALID-ORDER-77} \quad Z(s) = \left(\infty, \infty, \infty, \frac{R_4(C_4L_4s^2+1)}{C_4L_4s^2+C_4R_4s+1}, \infty, \frac{R_L(C_LL_Ls^2+1)}{C_LL_Ls^2+C_LR_Ls+1} \right)$$

$$H(s) = \frac{R_4R_L(C_4L_4s^2+1)(C_LL_Ls^2+1)}{C_4C_LL_LR_4s^4 + 2C_4C_LL_LR_LR_Ls^4 + C_4C_LL_LR_4R_Ls^3 + 2C_4C_LL_LR_4R_Ls^3 + C_4L_4R_4s^2 + 2C_4L_4R_Ls^2 + 2C_4R_4R_Ls + C_LL_LR_4s^2 + 2C_LL_LR_Ls^2 + C_LR_4R_Ls + R_4 + 2R_L}$$

11 PolynomialError