

# Filter Summary Report: TIA,simple,Z1,Z3

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10.89INVALID-ORDER-89	$Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \infty, \infty, \infty \right)$	20
10.90INVALID-ORDER-90	$Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$	21

<b>11 PolynomialError</b>	<b>21</b>
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# 1 Examined $H(z)$ for TIA simple Z1 Z3: $\frac{Z_1 Z_3 g_m}{Z_1 g_m + 1}$

$$H(z) = \frac{Z_1 Z_3 g_m}{Z_1 g_m + 1}$$

## 2 HP

## 3 BP

### 3.1 BP-1 $Z(s) = \left( R_1, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_3 R_1 R_3 g_m s}{R_1 R_3 g_m + R_3 + s^2 (C_3 L_3 R_1 R_3 g_m + C_3 L_3 R_3) + s (L_3 R_1 g_m + L_3)}$$

Parameters:

Q:  $C_3 R_3 \sqrt{\frac{1}{C_3 L_3}}$   
 wo:  $\sqrt{\frac{1}{C_3 L_3}}$   
 bandwidth:  $\frac{1}{C_3 R_3}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
 Qz: 0  
 Wz: None

### 3.2 BP-2 $Z(s) = \left( L_1 s, \infty, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_1 R_3 g_m s}{C_3 L_1 R_3 g_m s^2 + s (C_3 R_3 + L_1 g_m) + 1}$$

Parameters:

Q:  $\frac{C_3 L_1 R_3 g_m \sqrt{\frac{1}{C_3 L_1 R_3 g_m}}}{C_3 R_3 + L_1 g_m}$   
 wo:  $\sqrt{\frac{1}{C_3 L_1 R_3 g_m}}$   
 bandwidth:  $\frac{C_3 R_3 + L_1 g_m}{C_3 L_1 R_3 g_m}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $\frac{L_1 R_3 g_m}{C_3 R_3 + L_1 g_m}$   
 Qz: 0  
 Wz: None

### 3.3 BP-3 $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, R_3, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_1 R_3 g_m s}{C_1 L_1 s^2 + L_1 g_m s + 1}$$

Parameters:

Q:  $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{g_m}$   
 wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
 bandwidth:  $\frac{g_m}{C_1}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $R_3$   
 Qz: 0

Wz: None

$$\mathbf{3.4 \quad BP-4} \quad Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \quad \infty, \quad R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

**Parameters:**

Q:  $\frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1}$   
 wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
 bandwidth:  $\frac{R_1 g_m + 1}{C_1 R_1}$   
 K-LP: 0  
 K-HP: 0  
 K-BP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
 Qz: 0  
 Wz: None

$$H(s) = \frac{L_1 R_1 R_3 g_m s}{C_1 L_1 R_1 s^2 + R_1 + s(L_1 R_1 g_m + L_1)}$$

## 4 LP

$$\mathbf{4.1 \quad LP-1} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad \frac{R_3}{C_3 R_3 s + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

**Parameters:**

Q:  $\frac{C_1 C_3 R_3 \sqrt{\frac{g_m}{C_1 C_3 R_3}}}{C_1 + C_3 R_3 g_m}$   
 wo:  $\sqrt{\frac{g_m}{C_1 C_3 R_3}}$   
 bandwidth:  $\frac{C_1 + C_3 R_3 g_m}{C_1 C_3 R_3}$   
 K-LP:  $R_3$   
 K-HP: 0  
 K-BP: 0  
 Qz: None  
 Wz: None

$$H(s) = \frac{R_3 g_m}{C_1 C_3 R_3 s^2 + g_m + s(C_1 + C_3 R_3 g_m)}$$

$$\mathbf{4.2 \quad LP-2} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad \frac{R_3}{C_3 R_3 s + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

**Parameters:**

Q:  $\frac{C_1 C_3 R_1 R_3 \sqrt{\frac{R_1 g_m + 1}{C_1 C_3 R_1 R_3}}}{C_1 R_1 + C_3 R_1 R_3 g_m + C_3 R_3}$   
 wo:  $\sqrt{\frac{R_1 g_m + 1}{C_1 C_3 R_1 R_3}}$   
 bandwidth:  $\frac{C_1 R_1 + C_3 R_1 R_3 g_m + C_3 R_3}{C_1 C_3 R_1 R_3}$   
 K-LP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
 K-HP: 0  
 K-BP: 0  
 Qz: None  
 Wz: None

$$H(s) = \frac{R_1 R_3 g_m}{C_1 C_3 R_1 R_3 s^2 + R_1 g_m + s(C_1 R_1 + C_3 R_1 R_3 g_m + C_3 R_3) + 1}$$

**4.3 LP-3**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{g_m}$   
 wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
 bandwidth:  $\frac{g_m}{C_1}$   
 K-LP:  $\frac{L_1 g_m}{C_3}$   
 K-HP: 0  
 K-BP: 0  
 Qz: None  
 Wz: None

$$H(s) = \frac{L_1 g_m}{C_1 C_3 L_1 s^2 + C_3 L_1 g_m s + C_3}$$

**4.4 LP-4**  $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1}$   
 wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
 bandwidth:  $\frac{R_1 g_m + 1}{C_1 R_1}$   
 K-LP:  $\frac{L_1 g_m}{C_3}$   
 K-HP: 0  
 K-BP: 0  
 Qz: None  
 Wz: None

$$H(s) = \frac{L_1 R_1 g_m}{C_1 C_3 L_1 R_1 s^2 + C_3 R_1 + s (C_3 L_1 R_1 g_m + C_3 L_1)}$$

## 5 BS

**5.1 BS-1**  $Z(s) = \left( R_1, \infty, \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{L_3 \sqrt{\frac{1}{C_3 L_3}}}{R_3}$   
 wo:  $\sqrt{\frac{1}{C_3 L_3}}$   
 bandwidth:  $\frac{R_3}{L_3}$   
 K-LP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
 K-HP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
 K-BP: 0  
 Qz: None  
 Wz:  $\sqrt{\frac{1}{C_3 L_3}}$

$$H(s) = \frac{C_3 L_3 R_1 R_3 g_m s^2 + R_1 R_3 g_m}{R_1 g_m + s^2 (C_3 L_3 R_1 g_m + C_3 L_3) + s (C_3 R_1 R_3 g_m + C_3 R_3) + 1}$$

**5.2 BS-2**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, R_3, \infty, \infty, \infty \right)$

**Parameters:**

Q:  $L_1 g_m \sqrt{\frac{1}{C_1 L_1}}$   
wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
bandwidth:  $\frac{1}{L_1 g_m}$   
K-LP:  $R_3$   
K-HP:  $R_3$   
K-BP: 0  
Qz: None  
Wz:  $\sqrt{\frac{1}{C_1 L_1}}$

**5.3 BS-3**  $Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, R_3, \infty, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{L_1 \sqrt{\frac{1}{C_1 L_1}} (R_1 g_m + 1)}{R_1}$   
wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
bandwidth:  $\frac{R_1}{L_1 (R_1 g_m + 1)}$   
K-LP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
K-HP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
K-BP: 0  
Qz: None  
Wz:  $\sqrt{\frac{1}{C_1 L_1}}$

## 6 GE

**6.1 GE-1**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, R_3, \infty, \infty, \infty \right)$

**Parameters:**

Q:  $\frac{L_1 g_m \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1}$   
wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
bandwidth:  $\frac{R_1 g_m + 1}{L_1 g_m}$   
K-LP:  $R_3$   
K-HP:  $R_3$   
K-BP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
Qz:  $\frac{L_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1}$   
Wz:  $\sqrt{\frac{1}{C_1 L_1}}$

$$H(s) = \frac{C_1 L_1 R_3 g_m s^2 + R_3 g_m}{C_1 L_1 g_m s^2 + C_1 s + g_m}$$

$$H(s) = \frac{C_1 L_1 R_1 R_3 g_m s^2 + R_1 R_3 g_m}{C_1 R_1 s + R_1 g_m + s^2 (C_1 L_1 R_1 g_m + C_1 L_1) + 1}$$

$$H(s) = \frac{C_1 L_1 R_3 g_m s^2 + C_1 R_1 R_3 g_m s + R_3 g_m}{C_1 L_1 g_m s^2 + g_m + s (C_1 R_1 g_m + C_1)}$$



**6.2 GE-2**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, R_3, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 R_3 g_m s^2 + L_1 R_3 g_m s + R_1 R_3 g_m}{L_1 g_m s + R_1 g_m + s^2 (C_1 L_1 R_1 g_m + C_1 L_1) + 1}$$

**Parameters:**

Q:  $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}} (R_1 g_m + 1)}{g_m}$   
 wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
 bandwidth:  $\frac{g_m}{C_1 (R_1 g_m + 1)}$   
 K-LP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
 K-HP:  $\frac{R_1 R_3 g_m}{R_1 g_m + 1}$   
 K-BP:  $R_3$   
 Qz:  $C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}$   
 Wz:  $\sqrt{\frac{1}{C_1 L_1}}$

## 7 AP

## 8 INVALID-NUMER

**8.1 INVALID-NUMER-1**  $Z(s) = \left( R_1 + \frac{1}{C_1 s}, \infty, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 R_1 R_3 g_m s + R_3 g_m}{g_m + s^2 (C_1 C_3 R_1 R_3 g_m + C_1 C_3 R_3) + s (C_1 R_1 g_m + C_1 + C_3 R_3 g_m)}$$

**Parameters:**

Q:  $\frac{C_1 C_3 R_3 \sqrt{\frac{g_m}{C_1 C_3 R_3 (R_1 g_m + 1)}} (R_1 g_m + 1)}{C_1 R_1 g_m + C_1 + C_3 R_3 g_m}$   
 wo:  $\sqrt{\frac{g_m}{C_1 C_3 R_3 (R_1 g_m + 1)}}$   
 bandwidth:  $\frac{C_1 R_1 g_m + C_1 + C_3 R_3 g_m}{C_1 C_3 R_3 (R_1 g_m + 1)}$   
 K-LP:  $R_3$   
 K-HP: 0  
 K-BP:  $\frac{C_1 R_1 R_3 g_m}{C_1 R_1 g_m + C_1 + C_3 R_3 g_m}$   
 Qz: 0  
 Wz: None

**8.2 INVALID-NUMER-2**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 R_3 g_m s + L_1 g_m}{C_1 C_3 L_1 s^2 + C_3 L_1 g_m s + C_3}$$

**Parameters:**

Q:  $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{g_m}$   
 wo:  $\sqrt{\frac{1}{C_1 L_1}}$   
 bandwidth:  $\frac{g_m}{C_1}$   
 K-LP:  $\frac{L_1 g_m}{C_3}$   
 K-HP: 0  
 K-BP:  $R_3$   
 Qz: 0  
 Wz: None

### 8.3 INVALID-NUMER-3 $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 R_1 R_3 g_m s + L_1 R_1 g_m}{C_1 C_3 L_1 R_1 s^2 + C_3 R_1 + s (C_3 L_1 R_1 g_m + C_3 L_1)}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1} \\ \text{wo: } & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth: } & \frac{R_1 g_m + 1}{C_1 R_1} \\ \text{K-LP: } & \frac{L_1 g_m}{C_3} \\ \text{K-HP: } & 0 \\ \text{K-BP: } & \frac{R_1 R_3 g_m}{R_1 g_m + 1} \\ \text{Qz: } & 0 \\ \text{Wz: } & \text{None} \end{aligned}$$

## 9 INVALID-WZ

### 9.1 INVALID-WZ-1 $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 L_3 g_m s^2 + L_1 g_m}{C_1 C_3 L_1 s^2 + C_3 L_1 g_m s + C_3}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{g_m} \\ \text{wo: } & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth: } & \frac{g_m}{C_1} \\ \text{K-LP: } & \frac{L_1 g_m}{C_3} \\ \text{K-HP: } & \frac{L_3 g_m}{C_1} \\ \text{K-BP: } & 0 \\ \text{Qz: } & \text{None} \\ \text{Wz: } & \sqrt{\frac{1}{C_3 L_3}} \end{aligned}$$

### 9.2 INVALID-WZ-2 $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 L_3 g_m s^2 + C_3 L_1 R_3 g_m s + L_1 g_m}{C_1 C_3 L_1 s^2 + C_3 L_1 g_m s + C_3}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{g_m} \\ \text{wo: } & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth: } & \frac{g_m}{C_1} \\ \text{K-LP: } & \frac{L_1 g_m}{C_3} \\ \text{K-HP: } & \frac{L_3 g_m}{C_1} \\ \text{K-BP: } & R_3 \\ \text{Qz: } & \frac{L_3 \sqrt{\frac{1}{C_1 L_1}}}{R_3} \\ \text{Wz: } & \sqrt{\frac{1}{C_3 L_3}} \end{aligned}$$

**9.3 INVALID-WZ-3**  $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 L_3 R_1 g_m s^2 + L_1 R_1 g_m}{C_1 C_3 L_1 R_1 s^2 + C_3 R_1 + s (C_3 L_1 R_1 g_m + C_3 L_1)}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1} \\ \text{wo: } & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth: } & \frac{R_1 g_m + 1}{C_1 R_1} \\ \text{K-LP: } & \frac{L_1 g_m}{C_3} \\ \text{K-HP: } & \frac{L_3 g_m}{C_1} \\ \text{K-BP: } & 0 \\ \text{Qz: } & \text{None} \\ \text{Wz: } & \sqrt{\frac{1}{C_3 L_3}} \end{aligned}$$

**9.4 INVALID-WZ-4**  $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 L_3 R_1 g_m s^2 + C_3 L_1 R_1 R_3 g_m s + L_1 R_1 g_m}{C_1 C_3 L_1 R_1 s^2 + C_3 R_1 + s (C_3 L_1 R_1 g_m + C_3 L_1)}$$

**Parameters:**

$$\begin{aligned} \text{Q: } & \frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1 g_m + 1} \\ \text{wo: } & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth: } & \frac{R_1 g_m + 1}{C_1 R_1} \\ \text{K-LP: } & \frac{L_1 g_m}{C_3} \\ \text{K-HP: } & \frac{L_3 g_m}{C_1} \\ \text{K-BP: } & \frac{R_1 R_3 g_m}{R_1 g_m + 1} \\ \text{Qz: } & \frac{L_3 \sqrt{\frac{1}{C_1 L_1}}}{R_3} \\ \text{Wz: } & \sqrt{\frac{1}{C_3 L_3}} \end{aligned}$$

## 10 INVALID-ORDER

**10.1 INVALID-ORDER-1**  $Z(s) = (R_1, \infty, R_3, \infty, \infty, \infty)$

$$H(s) = \frac{R_1 R_3 g_m}{R_1 g_m + 1}$$

**10.2 INVALID-ORDER-2**  $Z(s) = \left( R_1, \infty, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{R_1 g_m}{s (C_3 R_1 g_m + C_3)}$$

**10.3 INVALID-ORDER-3**  $Z(s) = \left( R_1, \infty, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{R_1 R_3 g_m}{R_1 g_m + s (C_3 R_1 R_3 g_m + C_3 R_3) + 1}$$

$$10.4 \quad \text{INVALID-ORDER-4} \quad Z(s) = \left( R_1, \quad \infty, \quad R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 R_1 R_3 g_m s + R_1 g_m}{s (C_3 R_1 g_m + C_3)}$$

$$10.5 \quad \text{INVALID-ORDER-5} \quad Z(s) = \left( R_1, \quad \infty, \quad L_3 s + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_1 g_m s^2 + R_1 g_m}{s (C_3 R_1 g_m + C_3)}$$

$$10.6 \quad \text{INVALID-ORDER-6} \quad Z(s) = \left( R_1, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_3 R_1 g_m s}{R_1 g_m + s^2 (C_3 L_3 R_1 g_m + C_3 L_3) + 1}$$

$$10.7 \quad \text{INVALID-ORDER-7} \quad Z(s) = \left( R_1, \quad \infty, \quad L_3 s + R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_1 g_m s^2 + C_3 R_1 R_3 g_m s + R_1 g_m}{s (C_3 R_1 g_m + C_3)}$$

$$10.8 \quad \text{INVALID-ORDER-8} \quad Z(s) = \left( R_1, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_1 R_3 g_m s^2 + L_3 R_1 g_m s + R_1 R_3 g_m}{R_1 g_m + s^2 (C_3 L_3 R_1 g_m + C_3 L_3) + 1}$$

$$10.9 \quad \text{INVALID-ORDER-9} \quad Z(s) = (L_1 s, \quad \infty, \quad R_3, \quad \infty, \quad \infty, \quad \infty)$$

$$H(s) = \frac{L_1 R_3 g_m s}{L_1 g_m s + 1}$$

$$10.10 \quad \text{INVALID-ORDER-10} \quad Z(s) = \left( L_1 s, \quad \infty, \quad \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_1 g_m}{C_3 L_1 g_m s + C_3}$$

$$10.11 \quad \text{INVALID-ORDER-11} \quad Z(s) = \left( L_1 s, \quad \infty, \quad R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_1 R_3 g_m s + L_1 g_m}{C_3 L_1 g_m s + C_3}$$

$$10.12 \quad \text{INVALID-ORDER-12} \quad Z(s) = \left( L_1 s, \quad \infty, \quad L_3 s + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_1 L_3 g_m s^2 + L_1 g_m}{C_3 L_1 g_m s + C_3}$$

$$10.13 \quad \text{INVALID-ORDER-13} \quad Z(s) = \left( L_1 s, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_1 L_3 g_m s^2}{C_3 L_1 L_3 g_m s^3 + C_3 L_3 s^2 + L_1 g_m s + 1}$$

$$10.14 \quad \text{INVALID-ORDER-14} \quad Z(s) = \left( L_1 s, \quad \infty, \quad L_3 s + R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_1 L_3 g_m s^2 + C_3 L_1 R_3 g_m s + L_1 g_m}{C_3 L_1 g_m s + C_3}$$

$$10.15 \quad \text{INVALID-ORDER-15} \quad Z(s) = \left( L_1 s, \quad \infty, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_1 L_3 R_3 g_m s^2}{C_3 L_1 L_3 R_3 g_m s^3 + R_3 + s^2 (C_3 L_3 R_3 + L_1 L_3 g_m) + s (L_1 R_3 g_m + L_3)}$$

$$10.16 \quad \text{INVALID-ORDER-16} \quad Z(s) = \left( L_1 s, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_1 L_3 R_3 g_m s^3 + L_1 L_3 g_m s^2 + L_1 R_3 g_m s}{C_3 L_1 L_3 g_m s^3 + C_3 L_3 s^2 + L_1 g_m s + 1}$$

$$10.17 \quad \text{INVALID-ORDER-17} \quad Z(s) = \left( L_1 s, \quad \infty, \quad \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_1 L_3 R_3 g_m s^3 + L_1 R_3 g_m s}{C_3 L_1 L_3 g_m s^3 + s^2 (C_3 L_1 R_3 g_m + C_3 L_3) + s (C_3 R_3 + L_1 g_m) + 1}$$

$$10.18 \quad \text{INVALID-ORDER-18} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{R_3 g_m}{C_1 s + g_m}$$

$$10.19 \quad \text{INVALID-ORDER-19} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{g_m}{C_1 C_3 s^2 + C_3 g_m s}$$

$$10.20 \quad \text{INVALID-ORDER-20} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 R_3 g_m s + g_m}{C_1 C_3 s^2 + C_3 g_m s}$$

$$10.21 \quad \text{INVALID-ORDER-21} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad L_3 s + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 g_m s^2 + g_m}{C_1 C_3 s^2 + C_3 g_m s}$$

$$10.22 \quad \text{INVALID-ORDER-22} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_3 g_m s}{C_1 C_3 L_3 s^3 + C_1 s + C_3 L_3 g_m s^2 + g_m}$$

$$10.23 \quad \text{INVALID-ORDER-23} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad L_3 s + R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 g_m s^2 + C_3 R_3 g_m s + g_m}{C_1 C_3 s^2 + C_3 g_m s}$$

$$10.24 \quad \text{INVALID-ORDER-24} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_3 R_3 g_m s}{C_1 C_3 L_3 R_3 s^3 + R_3 g_m + s^2 (C_1 L_3 + C_3 L_3 R_3 g_m) + s (C_1 R_3 + L_3 g_m)}$$

$$10.25 \quad \text{INVALID-ORDER-25} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_3 g_m s^2 + L_3 g_m s + R_3 g_m}{C_1 C_3 L_3 s^3 + C_1 s + C_3 L_3 g_m s^2 + g_m}$$

$$10.26 \quad \text{INVALID-ORDER-26} \quad Z(s) = \left( \frac{1}{C_1 s}, \quad \infty, \quad \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_3 g_m s^2 + R_3 g_m}{C_1 C_3 L_3 s^3 + g_m + s^2 (C_1 C_3 R_3 + C_3 L_3 g_m) + s (C_1 + C_3 R_3 g_m)}$$

$$10.27 \quad \text{INVALID-ORDER-27} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{R_1 R_3 g_m}{C_1 R_1 s + R_1 g_m + 1}$$

$$10.28 \quad \text{INVALID-ORDER-28} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{R_1 g_m}{C_1 C_3 R_1 s^2 + s (C_3 R_1 g_m + C_3)}$$

$$10.29 \quad \text{INVALID-ORDER-29} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 R_1 R_3 g_m s + R_1 g_m}{C_1 C_3 R_1 s^2 + s (C_3 R_1 g_m + C_3)}$$

$$10.30 \quad \text{INVALID-ORDER-30} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad L_3 s + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_1 g_m s^2 + R_1 g_m}{C_1 C_3 R_1 s^2 + s (C_3 R_1 g_m + C_3)}$$

$$10.31 \quad \text{INVALID-ORDER-31} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_3 R_1 g_m s}{C_1 C_3 L_3 R_1 s^3 + C_1 R_1 s + R_1 g_m + s^2 (C_3 L_3 R_1 g_m + C_3 L_3) + 1}$$

$$10.32 \quad \text{INVALID-ORDER-32} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad L_3 s + R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_1 g_m s^2 + C_3 R_1 R_3 g_m s + R_1 g_m}{C_1 C_3 R_1 s^2 + s (C_3 R_1 g_m + C_3)}$$

$$10.33 \quad \text{INVALID-ORDER-33} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{L_3 R_1 R_3 g_m s}{C_1 C_3 L_3 R_1 R_3 s^3 + R_1 R_3 g_m + R_3 + s^2 (C_1 L_3 R_1 + C_3 L_3 R_1 R_3 g_m + C_3 L_3 R_3) + s (C_1 R_1 R_3 + L_3 R_1 g_m + L_3)}$$

$$10.34 \quad \text{INVALID-ORDER-34} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_1 R_3 g_m s^2 + L_3 R_1 g_m s + R_1 R_3 g_m}{C_1 C_3 L_3 R_1 s^3 + C_1 R_1 s + R_1 g_m + s^2 (C_3 L_3 R_1 g_m + C_3 L_3) + 1}$$

$$10.35 \quad \text{INVALID-ORDER-35} \quad Z(s) = \left( \frac{R_1}{C_1 R_1 s + 1}, \quad \infty, \quad \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_3 L_3 R_1 R_3 g_m s^2 + R_1 R_3 g_m}{C_1 C_3 L_3 R_1 s^3 + R_1 g_m + s^2 (C_1 C_3 R_1 R_3 + C_3 L_3 R_1 g_m + C_3 L_3) + s (C_1 R_1 + C_3 R_1 R_3 g_m + C_3 R_3) + 1}$$

$$10.36 \quad \text{INVALID-ORDER-36} \quad Z(s) = \left( R_1 + \frac{1}{C_1 s}, \quad \infty, \quad R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 R_1 R_3 g_m s + R_3 g_m}{g_m + s (C_1 R_1 g_m + C_1)}$$

$$10.37 \quad \text{INVALID-ORDER-37} \quad Z(s) = \left( R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 R_1 g_m s + g_m}{C_3 g_m s + s^2 (C_1 C_3 R_1 g_m + C_1 C_3)}$$

$$10.38 \quad \text{INVALID-ORDER-38} \quad Z(s) = \left( R_1 + \frac{1}{C_1 s}, \quad \infty, \quad R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 R_1 R_3 g_m s^2 + g_m + s (C_1 R_1 g_m + C_3 R_3 g_m)}{C_3 g_m s + s^2 (C_1 C_3 R_1 g_m + C_1 C_3)}$$

$$10.39 \quad \text{INVALID-ORDER-39} \quad Z(s) = \left( R_1 + \frac{1}{C_1 s}, \quad \infty, \quad L_3 s + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 L_3 R_1 g_m s^3 + C_1 R_1 g_m s + C_3 L_3 g_m s^2 + g_m}{C_3 g_m s + s^2 (C_1 C_3 R_1 g_m + C_1 C_3)}$$

$$10.40 \quad \text{INVALID-ORDER-40} \quad Z(s) = \left( R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 L_3 R_1 g_m s^2 + L_3 g_m s}{C_3 L_3 g_m s^2 + g_m + s^3 (C_1 C_3 L_3 R_1 g_m + C_1 C_3 L_3) + s (C_1 R_1 g_m + C_1)}$$

$$10.41 \quad \text{INVALID-ORDER-41} \quad Z(s) = \left( R_1 + \frac{1}{C_1 s}, \quad \infty, \quad L_3 s + R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 L_3 R_1 g_m s^3 + g_m + s^2 (C_1 C_3 R_1 R_3 g_m + C_3 L_3 g_m) + s (C_1 R_1 g_m + C_3 R_3 g_m)}{C_3 g_m s + s^2 (C_1 C_3 R_1 g_m + C_1 C_3)}$$

$$10.42 \quad \text{INVALID-ORDER-42} \quad Z(s) = \left( R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 L_3 R_1 R_3 g_m s^2 + L_3 R_3 g_m s}{R_3 g_m + s^3 (C_1 C_3 L_3 R_1 R_3 g_m + C_1 C_3 L_3 R_3) + s^2 (C_1 L_3 R_1 g_m + C_1 L_3 + C_3 L_3 R_3 g_m) + s (C_1 R_1 R_3 g_m + C_1 R_3 + L_3 g_m)}$$

$$10.43 \quad \text{INVALID-ORDER-43} \quad Z(s) = \left( R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 L_3 R_1 R_3 g_m s^3 + R_3 g_m + s^2 (C_1 L_3 R_1 g_m + C_3 L_3 R_3 g_m) + s (C_1 R_1 R_3 g_m + L_3 g_m)}{C_3 L_3 g_m s^2 + g_m + s^3 (C_1 C_3 L_3 R_1 g_m + C_1 C_3 L_3) + s (C_1 R_1 g_m + C_1)}$$

**10.44 INVALID-ORDER-44**  $Z(s) = \left( R_1 + \frac{1}{C_1 s}, \infty, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_3 R_1 R_3 g_m s^3 + C_1 R_1 R_3 g_m s + C_3 L_3 R_3 g_m s^2 + R_3 g_m}{g_m + s^3 (C_1 C_3 L_3 R_1 g_m + C_1 C_3 L_3) + s^2 (C_1 C_3 R_1 R_3 g_m + C_1 C_3 R_3 + C_3 L_3 g_m) + s (C_1 R_1 g_m + C_1 + C_3 R_3 g_m)}$$

**10.45 INVALID-ORDER-45**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 g_m s^2 + g_m}{C_1 C_3 L_1 g_m s^3 + C_1 C_3 s^2 + C_3 g_m s}$$

**10.46 INVALID-ORDER-46**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 R_3 g_m s^2 + R_3 g_m}{C_1 C_3 L_1 R_3 g_m s^3 + g_m + s^2 (C_1 C_3 R_3 + C_1 L_1 g_m) + s (C_1 + C_3 R_3 g_m)}$$

**10.47 INVALID-ORDER-47**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 R_3 g_m s^3 + C_1 L_1 g_m s^2 + C_3 R_3 g_m s + g_m}{C_1 C_3 L_1 g_m s^3 + C_1 C_3 s^2 + C_3 g_m s}$$

**10.48 INVALID-ORDER-48**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 g_m s^4 + g_m + s^2 (C_1 L_1 g_m + C_3 L_3 g_m)}{C_1 C_3 L_1 g_m s^3 + C_1 C_3 s^2 + C_3 g_m s}$$

**10.49 INVALID-ORDER-49**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 L_3 g_m s^3 + L_3 g_m s}{C_1 C_3 L_1 L_3 g_m s^4 + C_1 C_3 L_3 s^3 + C_1 s + g_m + s^2 (C_1 L_1 g_m + C_3 L_3 g_m)}$$

**10.50 INVALID-ORDER-50**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 g_m s^4 + C_1 C_3 L_1 R_3 g_m s^3 + C_3 R_3 g_m s + g_m + s^2 (C_1 L_1 g_m + C_3 L_3 g_m)}{C_1 C_3 L_1 g_m s^3 + C_1 C_3 s^2 + C_3 g_m s}$$

**10.51 INVALID-ORDER-51**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 L_3 R_3 g_m s^3 + L_3 R_3 g_m s}{C_1 C_3 L_1 L_3 R_3 g_m s^4 + R_3 g_m + s^3 (C_1 C_3 L_3 R_3 + C_1 L_1 L_3 g_m) + s^2 (C_1 L_1 R_3 g_m + C_1 L_3 + C_3 L_3 R_3 g_m) + s (C_1 R_3 + L_3 g_m)}$$

**10.52 INVALID-ORDER-52**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_3 g_m s^4 + C_1 L_1 L_3 g_m s^3 + L_3 g_m s + R_3 g_m + s^2 (C_1 L_1 R_3 g_m + C_3 L_3 R_3 g_m)}{C_1 C_3 L_1 L_3 g_m s^4 + C_1 C_3 L_3 s^3 + C_1 s + g_m + s^2 (C_1 L_1 g_m + C_3 L_3 g_m)}$$



**10.53 INVALID-ORDER-53**  $Z(s) = \left( L_1 s + \frac{1}{C_1 s}, \infty, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_3 g_m s^4 + R_3 g_m + s^2 (C_1 L_1 R_3 g_m + C_3 L_3 R_3 g_m)}{C_1 C_3 L_1 L_3 g_m s^4 + g_m + s^3 (C_1 C_3 L_1 R_3 g_m + C_1 C_3 L_3) + s^2 (C_1 C_3 R_3 + C_1 L_1 g_m + C_3 L_3 g_m) + s (C_1 + C_3 R_3 g_m)}$$

**10.54 INVALID-ORDER-54**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_1 R_3 g_m s}{C_1 C_3 L_1 R_3 s^3 + s^2 (C_1 L_1 + C_3 L_1 R_3 g_m) + s (C_3 R_3 + L_1 g_m) + 1}$$

**10.55 INVALID-ORDER-55**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_1 L_3 g_m s^2}{C_1 C_3 L_1 L_3 s^4 + C_3 L_1 L_3 g_m s^3 + L_1 g_m s + s^2 (C_1 L_1 + C_3 L_3) + 1}$$

**10.56 INVALID-ORDER-56**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_1 L_3 R_3 g_m s^2}{C_1 C_3 L_1 L_3 R_3 s^4 + R_3 + s^3 (C_1 L_1 L_3 + C_3 L_1 L_3 R_3 g_m) + s^2 (C_1 L_1 R_3 + C_3 L_3 R_3 + L_1 L_3 g_m) + s (L_1 R_3 g_m + L_3)}$$

**10.57 INVALID-ORDER-57**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 L_3 R_3 g_m s^3 + L_1 L_3 g_m s^2 + L_1 R_3 g_m s}{C_1 C_3 L_1 L_3 s^4 + C_3 L_1 L_3 g_m s^3 + L_1 g_m s + s^2 (C_1 L_1 + C_3 L_3) + 1}$$

**10.58 INVALID-ORDER-58**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 L_3 R_3 g_m s^3 + L_1 R_3 g_m s}{C_1 C_3 L_1 L_3 s^4 + s^3 (C_1 C_3 L_1 R_3 + C_3 L_1 L_3 g_m) + s^2 (C_1 L_1 + C_3 L_1 R_3 g_m + C_3 L_3) + s (C_3 R_3 + L_1 g_m) + 1}$$

**10.59 INVALID-ORDER-59**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 g_m s^2 + C_1 R_1 g_m s + g_m}{C_1 C_3 L_1 g_m s^3 + C_3 g_m s + s^2 (C_1 C_3 R_1 g_m + C_1 C_3)}$$

**10.60 INVALID-ORDER-60**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 R_3 g_m s^2 + C_1 R_1 R_3 g_m s + R_3 g_m}{C_1 C_3 L_1 R_3 g_m s^3 + g_m + s^2 (C_1 C_3 R_1 R_3 g_m + C_1 C_3 R_3 + C_1 L_1 g_m) + s (C_1 R_1 g_m + C_1 + C_3 R_3 g_m)}$$

**10.61 INVALID-ORDER-61**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 R_3 g_m s^3 + g_m + s^2 (C_1 C_3 R_1 R_3 g_m + C_1 L_1 g_m) + s (C_1 R_1 g_m + C_3 R_3 g_m)}{C_1 C_3 L_1 g_m s^3 + C_3 g_m s + s^2 (C_1 C_3 R_1 g_m + C_1 C_3)}$$

**10.62 INVALID-ORDER-62**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 g_m s^4 + C_1 C_3 L_3 R_1 g_m s^3 + C_1 R_1 g_m s + g_m + s^2 (C_1 L_1 g_m + C_3 L_3 g_m)}{C_1 C_3 L_1 g_m s^3 + C_3 g_m s + s^2 (C_1 C_3 R_1 g_m + C_1 C_3)}$$

**10.63 INVALID-ORDER-63**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 L_3 g_m s^3 + C_1 L_3 R_1 g_m s^2 + L_3 g_m s}{C_1 C_3 L_1 L_3 g_m s^4 + g_m + s^3 (C_1 C_3 L_3 R_1 g_m + C_1 C_3 L_3) + s^2 (C_1 L_1 g_m + C_3 L_3 g_m) + s (C_1 R_1 g_m + C_1)}$$

**10.64 INVALID-ORDER-64**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 g_m s^4 + g_m + s^3 (C_1 C_3 L_1 R_3 g_m + C_1 C_3 L_3 R_1 g_m) + s^2 (C_1 C_3 R_1 R_3 g_m + C_1 L_1 g_m + C_3 L_3 g_m) + s (C_1 R_1 g_m + C_3 R_3 g_m)}{C_1 C_3 L_1 g_m s^3 + C_3 g_m s + s^2 (C_1 C_3 R_1 g_m + C_1 C_3)}$$

**10.65 INVALID-ORDER-65**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 L_3 R_3 g_m s^3 + C_1 L_3 R_1 R_3 g_m s^2 + L_3 R_3 g_m s}{C_1 C_3 L_1 L_3 R_3 g_m s^4 + R_3 g_m + s^3 (C_1 C_3 L_3 R_1 R_3 g_m + C_1 C_3 L_3 R_3 + C_1 L_1 L_3 g_m) + s^2 (C_1 L_1 R_3 g_m + C_1 L_3 R_1 g_m + C_1 L_3 + C_3 L_3 R_3 g_m) + s (C_1 R_1 R_3 g_m + C_1 R_3 + L_3 g_m)}$$

**10.66 INVALID-ORDER-66**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_3 g_m s^4 + R_3 g_m + s^3 (C_1 C_3 L_3 R_1 R_3 g_m + C_1 L_1 L_3 g_m) + s^2 (C_1 L_1 R_3 g_m + C_1 L_3 R_1 g_m + C_3 L_3 R_3 g_m) + s (C_1 R_1 R_3 g_m + L_3 g_m)}{C_1 C_3 L_1 L_3 g_m s^4 + g_m + s^3 (C_1 C_3 L_3 R_1 g_m + C_1 C_3 L_3) + s^2 (C_1 L_1 g_m + C_3 L_3 g_m) + s (C_1 R_1 g_m + C_1)}$$

**10.67 INVALID-ORDER-67**  $Z(s) = \left( L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_3 g_m s^4 + C_1 C_3 L_3 R_1 R_3 g_m s^3 + C_1 R_1 R_3 g_m s + R_3 g_m + s^2 (C_1 L_1 R_3 g_m + C_3 L_3 R_3 g_m)}{C_1 C_3 L_1 L_3 g_m s^4 + g_m + s^3 (C_1 C_3 L_1 R_3 g_m + C_1 C_3 L_3 R_1 g_m + C_1 C_3 L_3) + s^2 (C_1 C_3 R_1 R_3 g_m + C_1 C_3 R_3 + C_1 L_1 g_m + C_3 L_3 g_m) + s (C_1 R_1 g_m + C_1 + C_3 R_3 g_m)}$$

**10.68 INVALID-ORDER-68**  $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_1 R_1 R_3 g_m s}{C_1 C_3 L_1 R_1 R_3 s^3 + R_1 + s^2 (C_1 L_1 R_1 + C_3 L_1 R_1 R_3 g_m + C_3 L_1 R_3) + s (C_3 R_1 R_3 + L_1 R_1 g_m + L_1)}$$

**10.69 INVALID-ORDER-69**  $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_1 L_3 R_1 g_m s^2}{C_1 C_3 L_1 L_3 R_1 s^4 + R_1 + s^3 (C_3 L_1 L_3 R_1 g_m + C_3 L_1 L_3) + s^2 (C_1 L_1 R_1 + C_3 L_3 R_1) + s (L_1 R_1 g_m + L_1)}$$

**10.70 INVALID-ORDER-70**  $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \infty, \infty, \infty \right)$

$$H(s) = \frac{L_1 L_3 R_1 R_3 g_m s^2}{C_1 C_3 L_1 L_3 R_1 R_3 s^4 + R_1 R_3 + s^3 (C_1 L_1 L_3 R_1 + C_3 L_1 L_3 R_1 R_3 g_m + C_3 L_1 L_3 R_3) + s^2 (C_1 L_1 R_1 R_3 + C_3 L_3 R_1 R_3 + L_1 L_3 R_1 g_m + L_1 L_3) + s (L_1 R_1 R_3 g_m + L_1 R_3 + L_3 R_1)}$$

**10.71 INVALID-ORDER-71**  $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 L_3 R_1 R_3 g_m s^3 + L_1 L_3 R_1 g_m s^2 + L_1 R_1 R_3 g_m s}{C_1 C_3 L_1 L_3 R_1 s^4 + R_1 + s^3 (C_3 L_1 L_3 R_1 g_m + C_3 L_1 L_3) + s^2 (C_1 L_1 R_1 + C_3 L_3 R_1) + s (L_1 R_1 g_m + L_1)}$$

**10.72 INVALID-ORDER-72**  $Z(s) = \left( \frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \frac{R_3 (C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_3 L_1 L_3 R_1 R_3 g_m s^3 + L_1 R_1 R_3 g_m s}{C_1 C_3 L_1 L_3 R_1 s^4 + R_1 + s^3 (C_1 C_3 L_1 R_1 R_3 + C_3 L_1 L_3 R_1 g_m + C_3 L_1 L_3) + s^2 (C_1 L_1 R_1 + C_3 L_1 R_1 R_3 g_m + C_3 L_1 R_3 + C_3 L_3 R_1) + s (C_3 R_1 R_3 + L_1 R_1 g_m + L_1)}$$

**10.73 INVALID-ORDER-73**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 g_m s^2 + L_1 g_m s + R_1 g_m}{C_3 L_1 g_m s^2 + s^3 (C_1 C_3 L_1 R_1 g_m + C_1 C_3 L_1) + s (C_3 R_1 g_m + C_3)}$$

**10.74 INVALID-ORDER-74**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, \frac{R_3}{C_3 R_3 s + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 R_1 R_3 g_m s^2 + L_1 R_3 g_m s + R_1 R_3 g_m}{R_1 g_m + s^3 (C_1 C_3 L_1 R_1 R_3 g_m + C_1 C_3 L_1 R_3) + s^2 (C_1 L_1 R_1 g_m + C_1 L_1 + C_3 L_1 R_3 g_m) + s (C_3 R_1 R_3 g_m + C_3 R_3 + L_1 g_m) + 1}$$

**10.75 INVALID-ORDER-75**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 R_1 R_3 g_m s^3 + R_1 g_m + s^2 (C_1 L_1 R_1 g_m + C_3 L_1 R_3 g_m) + s (C_3 R_1 R_3 g_m + L_1 g_m)}{C_3 L_1 g_m s^2 + s^3 (C_1 C_3 L_1 R_1 g_m + C_1 C_3 L_1) + s (C_3 R_1 g_m + C_3)}$$

**10.76 INVALID-ORDER-76**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, L_3 s + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_1 g_m s^4 + C_3 L_1 L_3 g_m s^3 + L_1 g_m s + R_1 g_m + s^2 (C_1 L_1 R_1 g_m + C_3 L_3 R_1 g_m)}{C_3 L_1 g_m s^2 + s^3 (C_1 C_3 L_1 R_1 g_m + C_1 C_3 L_1) + s (C_3 R_1 g_m + C_3)}$$

**10.77 INVALID-ORDER-77**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 L_3 R_1 g_m s^3 + L_1 L_3 g_m s^2 + L_3 R_1 g_m s}{C_3 L_1 L_3 g_m s^3 + L_1 g_m s + R_1 g_m + s^4 (C_1 C_3 L_1 L_3 R_1 g_m + C_1 C_3 L_1 L_3) + s^2 (C_1 L_1 R_1 g_m + C_1 L_1 + C_3 L_3 R_1 g_m + C_3 L_3) + 1}$$

**10.78 INVALID-ORDER-78**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, L_3 s + R_3 + \frac{1}{C_3 s}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_1 g_m s^4 + R_1 g_m + s^3 (C_1 C_3 L_1 R_1 R_3 g_m + C_3 L_1 L_3 g_m) + s^2 (C_1 L_1 R_1 g_m + C_3 L_1 R_3 g_m + C_3 L_3 R_1 g_m) + s (C_3 R_1 R_3 g_m + L_1 g_m)}{C_3 L_1 g_m s^2 + s^3 (C_1 C_3 L_1 R_1 g_m + C_1 C_3 L_1) + s (C_3 R_1 g_m + C_3)}$$

**10.79 INVALID-ORDER-79**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 L_1 L_3 R_1 R_3 g_m s^3 + L_1 L_3 R_3 g_m s^2 + L_3 R_1 R_3 g_m s}{R_1 R_3 g_m + R_3 + s^4 (C_1 C_3 L_1 L_3 R_1 R_3 g_m + C_1 C_3 L_1 L_3 R_3) + s^3 (C_1 L_1 L_3 R_1 g_m + C_1 L_1 L_3 + C_3 L_1 L_3 R_3 g_m) + s^2 (C_1 L_1 R_1 R_3 g_m + C_1 L_1 R_3 + C_3 L_3 R_1 R_3 g_m + C_3 L_3 R_3 + L_1 L_3 g_m) + s (L_1 R_3 g_m + L_3 R_1 g_m + L_3)}$$

**10.80 INVALID-ORDER-80**  $Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \infty, \infty, \infty \right)$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_1 R_3 g_m s^4 + R_1 R_3 g_m + s^3 (C_1 L_1 L_3 R_1 g_m + C_3 L_1 L_3 R_3 g_m) + s^2 (C_1 L_1 R_1 R_3 g_m + C_3 L_3 R_1 R_3 g_m + L_1 L_3 g_m) + s (L_1 R_3 g_m + L_3 R_1 g_m)}{C_3 L_1 L_3 g_m s^3 + L_1 g_m s + R_1 g_m + s^4 (C_1 C_3 L_1 L_3 R_1 g_m + C_1 C_3 L_1 L_3) + s^2 (C_1 L_1 R_1 g_m + C_1 L_1 + C_3 L_3 R_1 g_m + C_3 L_3) + 1}$$

$$10.81 \quad \text{INVALID-ORDER-81} \quad Z(s) = \left( \frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \frac{R_3(C_3 L_3 s^2 + 1)}{C_3 L_3 s^2 + C_3 R_3 s + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_1 R_3 g_m s^4 + C_3 L_1 L_3 R_3 g_m s^3 + L_1 R_3 g_m s + R_1 R_3 g_m + s^2 (C_1 L_1 R_1 R_3 g_m + C_3 L_3 R_1 R_3 g_m)}{R_1 g_m + s^4 (C_1 C_3 L_1 L_3 R_1 g_m + C_1 C_3 L_1 L_3) + s^3 (C_1 C_3 L_1 R_1 R_3 g_m + C_1 C_3 L_1 R_3 + C_3 L_1 L_3 g_m) + s^2 (C_1 L_1 R_1 g_m + C_1 L_1 + C_3 L_1 R_3 g_m + C_3 L_3 R_1 g_m + C_3 L_3) + s (C_3 R_1 R_3 g_m + C_3 R_3 + L_1 g_m) + 1}$$

$$10.82 \quad \text{INVALID-ORDER-82} \quad Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 L_1 R_1 g_m s^2 + R_1 g_m}{C_1 C_3 R_1 s^2 + s^3 (C_1 C_3 L_1 R_1 g_m + C_1 C_3 L_1) + s (C_3 R_1 g_m + C_3)}$$

$$10.83 \quad \text{INVALID-ORDER-83} \quad Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad \frac{R_3}{C_3 R_3 s + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 L_1 R_1 R_3 g_m s^2 + R_1 R_3 g_m}{R_1 g_m + s^3 (C_1 C_3 L_1 R_1 R_3 g_m + C_1 C_3 L_1 R_3) + s^2 (C_1 C_3 R_1 R_3 + C_1 L_1 R_1 g_m + C_1 L_1) + s (C_1 R_1 + C_3 R_1 R_3 g_m + C_3 R_3) + 1}$$

$$10.84 \quad \text{INVALID-ORDER-84} \quad Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 L_1 R_1 R_3 g_m s^3 + C_1 L_1 R_1 g_m s^2 + C_3 R_1 R_3 g_m s + R_1 g_m}{C_1 C_3 R_1 s^2 + s^3 (C_1 C_3 L_1 R_1 g_m + C_1 C_3 L_1) + s (C_3 R_1 g_m + C_3)}$$

$$10.85 \quad \text{INVALID-ORDER-85} \quad Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad L_3 s + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_1 g_m s^4 + R_1 g_m + s^2 (C_1 L_1 R_1 g_m + C_3 L_3 R_1 g_m)}{C_1 C_3 R_1 s^2 + s^3 (C_1 C_3 L_1 R_1 g_m + C_1 C_3 L_1) + s (C_3 R_1 g_m + C_3)}$$

$$10.86 \quad \text{INVALID-ORDER-86} \quad Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 L_1 L_3 R_1 g_m s^3 + L_3 R_1 g_m s}{C_1 C_3 L_3 R_1 s^3 + C_1 R_1 s + R_1 g_m + s^4 (C_1 C_3 L_1 L_3 R_1 g_m + C_1 C_3 L_1 L_3) + s^2 (C_1 L_1 R_1 g_m + C_1 L_1 + C_3 L_3 R_1 g_m + C_3 L_3) + 1}$$

$$10.87 \quad \text{INVALID-ORDER-87} \quad Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad L_3 s + R_3 + \frac{1}{C_3 s}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_1 g_m s^4 + C_1 C_3 L_1 R_1 R_3 g_m s^3 + C_3 R_1 R_3 g_m s + R_1 g_m + s^2 (C_1 L_1 R_1 g_m + C_3 L_3 R_1 g_m)}{C_1 C_3 R_1 s^2 + s^3 (C_1 C_3 L_1 R_1 g_m + C_1 C_3 L_1) + s (C_3 R_1 g_m + C_3)}$$

$$10.88 \quad \text{INVALID-ORDER-88} \quad Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad \frac{L_3 R_3 s}{C_3 L_3 R_3 s^2 + L_3 s + R_3}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 L_1 L_3 R_1 R_3 g_m s^3 + L_3 R_1 R_3 g_m s}{R_1 R_3 g_m + R_3 + s^4 (C_1 C_3 L_1 L_3 R_1 R_3 g_m + C_1 C_3 L_1 L_3 R_3) + s^3 (C_1 C_3 L_3 R_1 R_3 + C_1 L_1 L_3 R_1 g_m + C_1 L_1 L_3) + s^2 (C_1 L_1 R_1 R_3 g_m + C_1 L_1 R_3 + C_1 L_3 R_1 + C_3 L_3 R_1 R_3 g_m + C_3 L_3 R_3) + s (C_1 R_1 R_3 + L_3 R_1 g_m + L_3)}$$

$$10.89 \quad \text{INVALID-ORDER-89} \quad Z(s) = \left( \frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad \frac{L_3 s}{C_3 L_3 s^2 + 1} + R_3, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1 C_3 L_1 L_3 R_1 R_3 g_m s^4 + C_1 L_1 L_3 R_1 g_m s^3 + L_3 R_1 g_m s + R_1 R_3 g_m + s^2 (C_1 L_1 R_1 R_3 g_m + C_3 L_3 R_1 R_3 g_m)}{C_1 C_3 L_3 R_1 s^3 + C_1 R_1 s + R_1 g_m + s^4 (C_1 C_3 L_1 L_3 R_1 g_m + C_1 C_3 L_1 L_3) + s^2 (C_1 L_1 R_1 g_m + C_1 L_1 + C_3 L_3 R_1 g_m + C_3 L_3) + 1}$$

10.90    INVALID-ORDER-90

$$Z(s) = \left( \frac{R_1(C_1L_1s^2+1)}{C_1L_1s^2+C_1R_1s+1}, \quad \infty, \quad \frac{R_3(C_3L_3s^2+1)}{C_3L_3s^2+C_3R_3s+1}, \quad \infty, \quad \infty, \quad \infty \right)$$

$$H(s) = \frac{C_1C_3L_1L_3R_1R_3g_ms^4 + R_1R_3g_m + s^2(C_1L_1R_1R_3g_m + C_3L_3R_1R_3g_m)}{R_1g_m + s^4(C_1C_3L_1L_3R_1g_m + C_1C_3L_1L_3) + s^3(C_1C_3L_1R_1R_3g_m + C_1C_3L_1R_3 + C_1C_3L_3R_1) + s^2(C_1C_3R_1R_3 + C_1L_1R_1g_m + C_1L_1 + C_3L_3R_1g_m + C_3L_3) + s(C_1R_1 + C_3R_1R_3g_m + C_3R_3) + 1}$$

11    PolynomialError