

Filter Summary Report: TIA,simple,Z1,Z5

Generated by MacAnalog-Symbolix

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10 INVALID-ORDER

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10.1 INVALID-ORDER-1	$Z(s) = (R_1, \infty, \infty, \infty, R_5, \infty)$	8
10.2 INVALID-ORDER-2	$Z(s) = \left(R_1, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty\right)$	9
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10.9 INVALID-ORDER-9	$Z(s) = (L_1 s, \infty, \infty, \infty, R_5, \infty)$	9
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10.11INVALID-ORDER-11	$Z(s) = \left(L_1 s, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty\right)$	9
10.12INVALID-ORDER-12	$Z(s) = \left(L_1 s, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty\right)$	10
10.13INVALID-ORDER-13	$Z(s) = \left(L_1 s, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty\right)$	10
10.14INVALID-ORDER-14	$Z(s) = \left(L_1 s, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty\right)$	10
10.15INVALID-ORDER-15	$Z(s) = \left(L_1 s, \infty, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty\right)$	10
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10.18INVALID-ORDER-18	$Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, R_5, \infty\right)$	10
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10.24INVALID-ORDER-24	$Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty\right)$	11
10.25INVALID-ORDER-25	$Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty\right)$	11
10.26INVALID-ORDER-26	$Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty\right)$	11
10.27INVALID-ORDER-27	$Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, R_5, \infty\right)$	11
10.28INVALID-ORDER-28	$Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty\right)$	11
10.29INVALID-ORDER-29	$Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty\right)$	11
10.30INVALID-ORDER-30	$Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty\right)$	11
10.31INVALID-ORDER-31	$Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty\right)$	12
10.32INVALID-ORDER-32	$Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty\right)$	12
10.33INVALID-ORDER-33	$Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty\right)$	12
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10.35INVALID-ORDER-35	$Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty\right)$	12
10.36INVALID-ORDER-36	$Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, R_5, \infty\right)$	12
10.37INVALID-ORDER-37	$Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty\right)$	12
10.38INVALID-ORDER-38	$Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty\right)$	12
10.39INVALID-ORDER-39	$Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty\right)$	12
10.40INVALID-ORDER-40	$Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty\right)$	13

10.41INVALID-ORDER-41	$Z(s) = \left(R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, L_5s + R_5 + \frac{1}{C_5s}, \infty \right)$	13
10.42INVALID-ORDER-42	$Z(s) = \left(R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5}, \infty \right)$	13
10.43INVALID-ORDER-43	$Z(s) = \left(R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$	13
10.44INVALID-ORDER-44	$Z(s) = \left(R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$	13
10.45INVALID-ORDER-45	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{1}{C_5s}, \infty \right)$	13
10.46INVALID-ORDER-46	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{R_5}{C_5R_5s+1}, \infty \right)$	13
10.47INVALID-ORDER-47	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, R_5 + \frac{1}{C_5s}, \infty \right)$	13
10.48INVALID-ORDER-48	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, L_5s + \frac{1}{C_5s}, \infty \right)$	13
10.49INVALID-ORDER-49	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$	14
10.50INVALID-ORDER-50	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, L_5s + R_5 + \frac{1}{C_5s}, \infty \right)$	14
10.51INVALID-ORDER-51	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5}, \infty \right)$	14
10.52INVALID-ORDER-52	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$	14
10.53INVALID-ORDER-53	$Z(s) = \left(L_1s + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$	14
10.54INVALID-ORDER-54	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1}, \infty, \infty, \infty, \frac{R_5}{C_5R_5s+1}, \infty \right)$	14
10.55INVALID-ORDER-55	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$	14
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10.57INVALID-ORDER-57	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$	14
10.58INVALID-ORDER-58	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1}, \infty, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$	15
10.59INVALID-ORDER-59	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{1}{C_5s}, \infty \right)$	15
10.60INVALID-ORDER-60	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{R_5}{C_5R_5s+1}, \infty \right)$	15
10.61INVALID-ORDER-61	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, R_5 + \frac{1}{C_5s}, \infty \right)$	15
10.62INVALID-ORDER-62	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, L_5s + \frac{1}{C_5s}, \infty \right)$	15
10.63INVALID-ORDER-63	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$	15
10.64INVALID-ORDER-64	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, L_5s + R_5 + \frac{1}{C_5s}, \infty \right)$	15
10.65INVALID-ORDER-65	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5}, \infty \right)$	15
10.66INVALID-ORDER-66	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$	15
10.67INVALID-ORDER-67	$Z(s) = \left(L_1s + R_1 + \frac{1}{C_1s}, \infty, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$	16
10.68INVALID-ORDER-68	$Z(s) = \left(\frac{L_1R_1s}{C_1L_1R_1s^2+L_1s+R_1}, \infty, \infty, \infty, \frac{R_5}{C_5R_5s+1}, \infty \right)$	16
10.69INVALID-ORDER-69	$Z(s) = \left(\frac{L_1R_1s}{C_1L_1R_1s^2+L_1s+R_1}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$	16
10.70INVALID-ORDER-70	$Z(s) = \left(\frac{L_1R_1s}{C_1L_1R_1s^2+L_1s+R_1}, \infty, \infty, \infty, \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5}, \infty \right)$	16
10.71INVALID-ORDER-71	$Z(s) = \left(\frac{L_1R_1s}{C_1L_1R_1s^2+L_1s+R_1}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$	16
10.72INVALID-ORDER-72	$Z(s) = \left(\frac{L_1R_1s}{C_1L_1R_1s^2+L_1s+R_1}, \infty, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$	16
10.73INVALID-ORDER-73	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1} + R_1, \infty, \infty, \infty, \frac{1}{C_5s}, \infty \right)$	16
10.74INVALID-ORDER-74	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1} + R_1, \infty, \infty, \infty, \frac{R_5}{C_5R_5s+1}, \infty \right)$	16
10.75INVALID-ORDER-75	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1} + R_1, \infty, \infty, \infty, R_5 + \frac{1}{C_5s}, \infty \right)$	16
10.76INVALID-ORDER-76	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1} + R_1, \infty, \infty, \infty, L_5s + \frac{1}{C_5s}, \infty \right)$	17
10.77INVALID-ORDER-77	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1} + R_1, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$	17
10.78INVALID-ORDER-78	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1} + R_1, \infty, \infty, \infty, L_5s + R_5 + \frac{1}{C_5s}, \infty \right)$	17
10.79INVALID-ORDER-79	$Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1} + R_1, \infty, \infty, \infty, \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5}, \infty \right)$	17

10.80INVALID-ORDER-80	$Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$	17
10.81INVALID-ORDER-81	$Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \infty, \infty, \infty, \frac{R_5(C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$	17
10.82INVALID-ORDER-82	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$	17
10.83INVALID-ORDER-83	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$	17
10.84INVALID-ORDER-84	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$	17
10.85INVALID-ORDER-85	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$	18
10.86INVALID-ORDER-86	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$	18
10.87INVALID-ORDER-87	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$	18
10.88INVALID-ORDER-88	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$	18
10.89INVALID-ORDER-89	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$	18
10.90INVALID-ORDER-90	$Z(s) = \left(\frac{R_1(C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{R_5(C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$	18

1 Examined $H(z)$ for TIA simple Z1 Z5: $\frac{Z_1(Z_5g_m-1)}{2Z_1g_m+1}$

$$H(z) = \frac{Z_1 (Z_5g_m - 1)}{2Z_1g_m + 1}$$

2 HP

3 BP

3.1 BP-1 $Z(s) = \left(\frac{L_1s}{C_1L_1s^2+1}, \infty, \infty, \infty, R_5, \infty \right)$

$$H(s) = \frac{L_1s (R_5g_m - 1)}{C_1L_1s^2 + 2L_1g_ms + 1}$$

Parameters:

Q: $\frac{C_1\sqrt{\frac{1}{C_1L_1}}}{2g_m}$
wo: $\sqrt{\frac{1}{C_1L_1}}$
bandwidth: $\frac{2g_m}{C_1}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_5g_m-1}{2g_m}$
Qz: 0
Wz: None

3.2 BP-2 $Z(s) = \left(\frac{L_1R_1s}{C_1L_1R_1s^2+L_1s+R_1}, \infty, \infty, \infty, R_5, \infty \right)$

$$H(s) = \frac{L_1R_1s (R_5g_m - 1)}{C_1L_1R_1s^2 + 2L_1R_1g_ms + L_1s + R_1}$$

Parameters:

Q: $\frac{C_1R_1\sqrt{\frac{1}{C_1L_1}}}{2R_1g_m+1}$
wo: $\sqrt{\frac{1}{C_1L_1}}$
bandwidth: $\frac{2R_1g_m+1}{C_1R_1}$
K-LP: 0
K-HP: 0
K-BP: $\frac{R_1(R_5g_m-1)}{2R_1g_m+1}$
Qz: 0
Wz: None

4 LP

5 BS

5.1 BS-1 $Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \infty, \infty, \infty, R_5, \infty \right)$

Parameters:

$$\begin{aligned} \text{Q: } & 2L_1 g_m \sqrt{\frac{1}{C_1 L_1}} \\ \text{wo: } & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth: } & \frac{1}{2L_1 g_m} \\ \text{K-LP: } & \frac{R_5 g_m - 1}{2g_m} \\ \text{K-HP: } & \frac{R_5 g_m - 1}{2g_m} \\ \text{K-BP: } & 0 \\ \text{Qz: } & \text{None} \\ \text{Wz: } & \sqrt{\frac{1}{C_1 L_1}} \end{aligned}$$

5.2 BS-2 $Z(s) = \left(\frac{R_1 (C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \infty, \infty, \infty, R_5, \infty \right)$

Parameters:

$$\begin{aligned} \text{Q: } & \frac{L_1 \sqrt{\frac{1}{C_1 L_1}} (2R_1 g_m + 1)}{R_1} \\ \text{wo: } & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth: } & \frac{R_1}{L_1 (2R_1 g_m + 1)} \\ \text{K-LP: } & \frac{R_1 (R_5 g_m - 1)}{2R_1 g_m + 1} \\ \text{K-HP: } & \frac{R_1 (R_5 g_m - 1)}{2R_1 g_m + 1} \\ \text{K-BP: } & 0 \\ \text{Qz: } & \text{None} \\ \text{Wz: } & \sqrt{\frac{1}{C_1 L_1}} \end{aligned}$$

6 GE

6.1 GE-1 $Z(s) = \left(R_1, \infty, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$

Parameters:

$$\begin{aligned} \text{Q: } & C_5 R_5 \sqrt{\frac{1}{C_5 L_5}} \\ \text{wo: } & \sqrt{\frac{1}{C_5 L_5}} \\ \text{bandwidth: } & \frac{1}{C_5 R_5} \\ \text{K-LP: } & -\frac{R_1}{2R_1 g_m + 1} \\ \text{K-HP: } & -\frac{R_1}{2R_1 g_m + 1} \\ \text{K-BP: } & \frac{R_1 (R_5 g_m - 1)}{2R_1 g_m + 1} \\ \text{Qz: } & -\frac{C_5 R_5 \sqrt{\frac{1}{C_5 L_5}}}{R_5 g_m - 1} \\ \text{Wz: } & \sqrt{\frac{1}{C_5 L_5}} \end{aligned}$$

$$H(s) = \frac{(R_5 g_m - 1) (C_1 L_1 s^2 + 1)}{2C_1 L_1 g_m s^2 + C_1 s + 2g_m}$$

$$H(s) = \frac{R_1 (R_5 g_m - 1) (C_1 L_1 s^2 + 1)}{2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + C_1 R_1 s + 2R_1 g_m + 1}$$

$$H(s) = -\frac{R_1 (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(2R_1 g_m + 1) (C_5 L_5 R_5 s^2 + L_5 s + R_5)}$$

$$\mathbf{6.2 \quad GE-2} \quad Z(s) = \left(R_1, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5(C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \quad \infty \right)$$

Parameters:

$$\begin{aligned} \text{Q:} & \frac{L_5 \sqrt{\frac{1}{C_5 L_5}}}{R_5} \\ \text{wo:} & \sqrt{\frac{1}{C_5 L_5}} \\ \text{bandwidth:} & \frac{R_5}{L_5} \\ \text{K-LP:} & \frac{R_1(R_5 g_m - 1)}{2R_1 g_m + 1} \\ \text{K-HP:} & \frac{R_1(R_5 g_m - 1)}{2R_1 g_m + 1} \\ \text{K-BP:} & -\frac{R_1}{2R_1 g_m + 1} \\ \text{Qz:} & \frac{L_5 \sqrt{\frac{1}{C_5 L_5}} (-R_5 g_m + 1)}{R_5} \\ \text{Wz:} & \sqrt{\frac{1}{C_5 L_5}} \end{aligned}$$

$$\mathbf{6.3 \quad GE-3} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad R_5, \quad \infty \right)$$

Parameters:

$$\begin{aligned} \text{Q:} & \frac{2L_1 g_m \sqrt{\frac{1}{C_1 L_1}}}{2R_1 g_m + 1} \\ \text{wo:} & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth:} & \frac{2R_1 g_m + 1}{2L_1 g_m} \\ \text{K-LP:} & \frac{R_5 g_m - 1}{2g_m} \\ \text{K-HP:} & \frac{R_5 g_m - 1}{2g_m} \\ \text{K-BP:} & \frac{R_1(R_5 g_m - 1)}{2R_1 g_m + 1} \\ \text{Qz:} & \frac{L_1 \sqrt{\frac{1}{C_1 L_1}}}{R_1} \\ \text{Wz:} & \sqrt{\frac{1}{C_1 L_1}} \end{aligned}$$

$$\mathbf{6.4 \quad GE-4} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad R_5, \quad \infty \right)$$

Parameters:

$$\begin{aligned} \text{Q:} & \frac{C_1 \sqrt{\frac{1}{C_1 L_1}} (2R_1 g_m + 1)}{2g_m} \\ \text{wo:} & \sqrt{\frac{1}{C_1 L_1}} \\ \text{bandwidth:} & \frac{2g_m}{C_1 (2R_1 g_m + 1)} \\ \text{K-LP:} & \frac{R_1(R_5 g_m - 1)}{2R_1 g_m + 1} \\ \text{K-HP:} & \frac{R_1(R_5 g_m - 1)}{2R_1 g_m + 1} \\ \text{K-BP:} & \frac{R_5 g_m - 1}{2g_m} \\ \text{Qz:} & C_1 R_1 \sqrt{\frac{1}{C_1 L_1}} \\ \text{Wz:} & \sqrt{\frac{1}{C_1 L_1}} \end{aligned}$$

7 AP

$$H(s) = -\frac{R_1 (-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(2R_1 g_m + 1) (C_5 L_5 s^2 + C_5 R_5 s + 1)}$$

$$H(s) = \frac{(R_5 g_m - 1) (C_1 L_1 s^2 + C_1 R_1 s + 1)}{2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m}$$

$$H(s) = \frac{(R_5 g_m - 1) (C_1 L_1 R_1 s^2 + L_1 s + R_1)}{2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1}$$

8 INVALID-NUMER

8.1 INVALID-NUMER-1 $Z(s) = \left(L_1 s, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

Parameters:

$$\begin{aligned} \text{Q: } & \frac{\sqrt{2} C_5 L_1 R_5 g_m \sqrt{\frac{1}{C_5 L_1 R_5 g_m}}}{C_5 R_5 + 2 L_1 g_m} \\ \text{wo: } & \frac{\sqrt{2} \sqrt{\frac{1}{C_5 L_1 R_5 g_m}}}{2} \\ \text{bandwidth: } & \frac{C_5 R_5 + 2 L_1 g_m}{2 C_5 L_1 R_5 g_m} \\ \text{K-LP: } & 0 \\ \text{K-HP: } & -\frac{1}{2 g_m} \\ \text{K-BP: } & \frac{L_1 (R_5 g_m - 1)}{C_5 R_5 + 2 L_1 g_m} \\ \text{QZ: } & -\frac{\sqrt{2} C_5 R_5 \sqrt{\frac{1}{C_5 L_1 R_5 g_m}}}{2 R_5 g_m - 2} \\ \text{Wz: } & \text{None} \end{aligned}$$

$$H(s) = -\frac{L_1 s (C_5 R_5 s - R_5 g_m + 1)}{(C_5 R_5 s + 1) (2 L_1 g_m s + 1)}$$

8.2 INVALID-NUMER-2 $Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

Parameters:

$$\begin{aligned} \text{Q: } & \frac{\sqrt{2} C_1 C_5 R_5 \sqrt{\frac{g_m}{C_1 C_5 R_5}}}{C_1 + 2 C_5 R_5 g_m} \\ \text{wo: } & \sqrt{2} \sqrt{\frac{g_m}{C_1 C_5 R_5}} \\ \text{bandwidth: } & \frac{C_1 + 2 C_5 R_5 g_m}{C_1 C_5 R_5} \\ \text{K-LP: } & \frac{R_5 g_m - 1}{2 g_m} \\ \text{K-HP: } & 0 \\ \text{K-BP: } & -\frac{C_5 R_5}{C_1 + 2 C_5 R_5 g_m} \\ \text{QZ: } & 0 \\ \text{Wz: } & \text{None} \end{aligned}$$

$$H(s) = \frac{-C_5 R_5 s + R_5 g_m - 1}{(C_1 s + 2 g_m) (C_5 R_5 s + 1)}$$

8.3 INVALID-NUMER-3 $Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

Parameters:

$$\begin{aligned} \text{Q: } & \frac{C_1 C_5 R_1 R_5 \sqrt{\frac{2 R_1 g_m + 1}{C_1 C_5 R_1 R_5}}}{C_1 R_1 + 2 C_5 R_1 R_5 g_m + C_5 R_5} \\ \text{wo: } & \sqrt{\frac{2 R_1 g_m + 1}{C_1 C_5 R_1 R_5}} \\ \text{bandwidth: } & \frac{C_1 R_1 + 2 C_5 R_1 R_5 g_m + C_5 R_5}{C_1 C_5 R_1 R_5} \\ \text{K-LP: } & \frac{R_1 (R_5 g_m - 1)}{2 R_1 g_m + 1} \\ \text{K-HP: } & 0 \\ \text{K-BP: } & -\frac{C_5 R_1 R_5}{C_1 R_1 + 2 C_5 R_1 R_5 g_m + C_5 R_5} \\ \text{QZ: } & 0 \\ \text{Wz: } & \text{None} \end{aligned}$$

$$H(s) = -\frac{R_1 (C_5 R_5 s - R_5 g_m + 1)}{(C_5 R_5 s + 1) (C_1 R_1 s + 2 R_1 g_m + 1)}$$

8.4 INVALID-NUMER-4 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$

Parameters:

Q: $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{2g_m}$
 wo: $\sqrt{\frac{1}{C_1 L_1}}$
 bandwidth: $\frac{2g_m}{C_1}$
 K-LP: $\frac{L_1 g_m}{C_5}$
 K-HP: 0
 K-BP: $-\frac{1}{2g_m}$
 Qz: 0
 Wz: None

$$H(s) = \frac{L_1 (-C_5 s + g_m)}{C_5 (C_1 L_1 s^2 + 2L_1 g_m s + 1)}$$

8.5 INVALID-NUMER-5 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$

Parameters:

Q: $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{2g_m}$
 wo: $\sqrt{\frac{1}{C_1 L_1}}$
 bandwidth: $\frac{2g_m}{C_1}$
 K-LP: $\frac{L_1 g_m}{C_5}$
 K-HP: 0
 K-BP: $\frac{R_5 g_m - 1}{2g_m}$
 Qz: 0
 Wz: None

$$H(s) = \frac{L_1 (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 (C_1 L_1 s^2 + 2L_1 g_m s + 1)}$$

8.6 INVALID-NUMER-6 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$

Parameters:

Q: $\frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{2R_1 g_m + 1}$
 wo: $\sqrt{\frac{1}{C_1 L_1}}$
 bandwidth: $\frac{2R_1 g_m + 1}{C_1 R_1}$
 K-LP: $\frac{L_1 g_m}{C_5}$
 K-HP: 0
 K-BP: $-\frac{R_1}{2R_1 g_m + 1}$
 Qz: 0
 Wz: None

$$H(s) = \frac{L_1 R_1 (-C_5 s + g_m)}{C_5 (C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

8.7 INVALID-NUMER-7 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$

Parameters:

Q: $\frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{2R_1 g_m + 1}$

$$H(s) = \frac{L_1 R_1 (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 (C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

wo: $\sqrt{\frac{1}{C_1 L_1}}$
 bandwidth: $\frac{2R_1 g_m + 1}{C_1 R_1}$
 K-LP: $\frac{L_1 g_m}{C_5}$
 K-HP: 0
 K-BP: $\frac{R_1(R_5 g_m - 1)}{2R_1 g_m + 1}$
 Qz: 0
 Wz: None

9 INVALID-WZ

9.1 INVALID-WZ-1 $Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$

$$H(s) = -\frac{(C_1 R_1 s + 1)(C_5 R_5 s - R_5 g_m + 1)}{(C_5 R_5 s + 1)(2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

Parameters:

Q: $\frac{\sqrt{2C_1 C_5 R_5} \sqrt{\frac{g_m}{C_1 C_5 R_5 (2R_1 g_m + 1)}} (2R_1 g_m + 1)}{2C_1 R_1 g_m + C_1 + 2C_5 R_5 g_m}$
 wo: $\sqrt{2} \sqrt{\frac{g_m}{C_1 C_5 R_5 (2R_1 g_m + 1)}}$
 bandwidth: $\frac{2C_1 R_1 g_m + C_1 + 2C_5 R_5 g_m}{C_1 C_5 R_5 (2R_1 g_m + 1)}$
 K-LP: $\frac{R_5 g_m - 1}{2g_m}$
 K-HP: $-\frac{R_1}{2R_1 g_m + 1}$
 K-BP: $\frac{C_1 R_1 R_5 g_m - C_1 R_1 - C_5 R_5}{2C_1 R_1 g_m + C_1 + 2C_5 R_5 g_m}$
 Qz: $\frac{\sqrt{2C_1 C_5 R_1 R_5} \sqrt{\frac{g_m}{C_1 C_5 R_5 (2R_1 g_m + 1)}}}{-C_1 R_1 R_5 g_m + C_1 R_1 + C_5 R_5}$
 Wz: $\sqrt{\frac{-R_5 g_m + 1}{C_1 C_5 R_1 R_5}}$

9.2 INVALID-WZ-2 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{L_1 (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 (C_1 L_1 s^2 + 2L_1 g_m s + 1)}$$

Parameters:

Q: $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{2g_m}$
 wo: $\sqrt{\frac{1}{C_1 L_1}}$
 bandwidth: $\frac{2g_m}{C_1}$
 K-LP: $\frac{L_1 g_m}{C_5}$
 K-HP: $\frac{L_5 g_m}{C_1}$
 K-BP: $-\frac{1}{2g_m}$
 Qz: $-L_5 g_m \sqrt{\frac{1}{C_1 L_1}}$
 Wz: $\sqrt{\frac{1}{C_5 L_5}}$

9.3 INVALID-WZ-3 $Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{L_1 (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 (C_1 L_1 s^2 + 2L_1 g_m s + 1)}$$

Parameters:

Q: $\frac{C_1 \sqrt{\frac{1}{C_1 L_1}}}{2g_m}$
 wo: $\sqrt{\frac{1}{C_1 L_1}}$

$$\begin{aligned}
&\text{bandwidth: } \frac{2g_m}{C_1} \\
&\text{K-LP: } \frac{L_1 g_m}{C_5} \\
&\text{K-HP: } \frac{L_5 g_m}{C_1} \\
&\text{K-BP: } \frac{R_5 g_m - 1}{2g_m} \\
&\text{QZ: } \frac{L_5 g_m \sqrt{\frac{1}{C_1 L_1}}}{R_5 g_m - 1} \\
&\text{WZ: } \sqrt{\frac{1}{C_5 L_5}}
\end{aligned}$$

9.4 INVALID-WZ-4 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{L_1 R_1 (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 (C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

Parameters:

$$\begin{aligned}
&\text{Q: } \frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{2R_1 g_m + 1} \\
&\text{wo: } \sqrt{\frac{1}{C_1 L_1}} \\
&\text{bandwidth: } \frac{2R_1 g_m + 1}{C_1 R_1} \\
&\text{K-LP: } \frac{L_1 g_m}{C_5} \\
&\text{K-HP: } \frac{L_5 g_m}{C_1} \\
&\text{K-BP: } -\frac{R_1}{2R_1 g_m + 1} \\
&\text{QZ: } -L_5 g_m \sqrt{\frac{1}{C_1 L_1}} \\
&\text{WZ: } \sqrt{\frac{1}{C_5 L_5}}
\end{aligned}$$

9.5 INVALID-WZ-5 $Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$

$$H(s) = \frac{L_1 R_1 (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 (C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

Parameters:

$$\begin{aligned}
&\text{Q: } \frac{C_1 R_1 \sqrt{\frac{1}{C_1 L_1}}}{2R_1 g_m + 1} \\
&\text{wo: } \sqrt{\frac{1}{C_1 L_1}} \\
&\text{bandwidth: } \frac{2R_1 g_m + 1}{C_1 R_1} \\
&\text{K-LP: } \frac{L_1 g_m}{C_5} \\
&\text{K-HP: } \frac{L_5 g_m}{C_1} \\
&\text{K-BP: } \frac{R_1 (R_5 g_m - 1)}{2R_1 g_m + 1} \\
&\text{QZ: } \frac{L_5 g_m \sqrt{\frac{1}{C_1 L_1}}}{R_5 g_m - 1} \\
&\text{WZ: } \sqrt{\frac{1}{C_5 L_5}}
\end{aligned}$$

10 INVALID-ORDER

10.1 INVALID-ORDER-1 $Z(s) = (R_1, \infty, \infty, \infty, R_5, \infty)$

$$H(s) = \frac{R_1 (R_5 g_m - 1)}{2R_1 g_m + 1}$$

$$10.2 \quad \text{INVALID-ORDER-2} \quad Z(s) = \left(R_1, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_1 (-C_5 s + g_m)}{C_5 s (2R_1 g_m + 1)}$$

$$10.3 \quad \text{INVALID-ORDER-3} \quad Z(s) = \left(R_1, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$$

$$H(s) = -\frac{R_1 (C_5 R_5 s - R_5 g_m + 1)}{(2R_1 g_m + 1) (C_5 R_5 s + 1)}$$

$$10.4 \quad \text{INVALID-ORDER-4} \quad Z(s) = \left(R_1, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_1 (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2R_1 g_m + 1)}$$

$$10.5 \quad \text{INVALID-ORDER-5} \quad Z(s) = \left(R_1, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_1 (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 s (2R_1 g_m + 1)}$$

$$10.6 \quad \text{INVALID-ORDER-6} \quad Z(s) = \left(R_1, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$$

$$H(s) = -\frac{R_1 (C_5 L_5 s^2 - L_5 g_m s + 1)}{(2R_1 g_m + 1) (C_5 L_5 s^2 + 1)}$$

$$10.7 \quad \text{INVALID-ORDER-7} \quad Z(s) = \left(R_1, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_1 (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2R_1 g_m + 1)}$$

$$10.8 \quad \text{INVALID-ORDER-8} \quad Z(s) = \left(R_1, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$$

$$H(s) = \frac{R_1 (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(2R_1 g_m + 1) (C_5 L_5 s^2 + 1)}$$

$$10.9 \quad \text{INVALID-ORDER-9} \quad Z(s) = (L_1 s, \infty, \infty, \infty, R_5, \infty)$$

$$H(s) = \frac{L_1 s (R_5 g_m - 1)}{2L_1 g_m s + 1}$$

$$10.10 \quad \text{INVALID-ORDER-10} \quad Z(s) = \left(L_1 s, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{L_1 (-C_5 s + g_m)}{C_5 (2L_1 g_m s + 1)}$$

$$10.11 \quad \text{INVALID-ORDER-11} \quad Z(s) = \left(L_1 s, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{L_1 (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 (2L_1 g_m s + 1)}$$

$$10.12 \quad \text{INVALID-ORDER-12} \quad Z(s) = \left(L_1 s, \quad \infty, \quad \infty, \quad \infty, \quad L_5 s + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{L_1 (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 (2L_1 g_m s + 1)}$$

$$10.13 \quad \text{INVALID-ORDER-13} \quad Z(s) = \left(L_1 s, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 s (C_5 L_5 s^2 - L_5 g_m s + 1)}{(C_5 L_5 s^2 + 1) (2L_1 g_m s + 1)}$$

$$10.14 \quad \text{INVALID-ORDER-14} \quad Z(s) = \left(L_1 s, \quad \infty, \quad \infty, \quad \infty, \quad L_5 s + R_5 + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{L_1 (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 (2L_1 g_m s + 1)}$$

$$10.15 \quad \text{INVALID-ORDER-15} \quad Z(s) = \left(L_1 s, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 s (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(2L_1 g_m s + 1) (C_5 L_5 R_5 s^2 + L_5 s + R_5)}$$

$$10.16 \quad \text{INVALID-ORDER-16} \quad Z(s) = \left(L_1 s, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \quad \infty \right)$$

$$H(s) = \frac{L_1 s (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(C_5 L_5 s^2 + 1) (2L_1 g_m s + 1)}$$

$$10.17 \quad \text{INVALID-ORDER-17} \quad Z(s) = \left(L_1 s, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 s (-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(2L_1 g_m s + 1) (C_5 L_5 s^2 + C_5 R_5 s + 1)}$$

$$10.18 \quad \text{INVALID-ORDER-18} \quad Z(s) = \left(\frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad R_5, \quad \infty \right)$$

$$H(s) = \frac{R_5 g_m - 1}{C_1 s + 2g_m}$$

$$10.19 \quad \text{INVALID-ORDER-19} \quad Z(s) = \left(\frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{-C_5 s + g_m}{C_5 s (C_1 s + 2g_m)}$$

$$10.20 \quad \text{INVALID-ORDER-20} \quad Z(s) = \left(\frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad R_5 + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{C_5 R_5 g_m s - C_5 s + g_m}{C_5 s (C_1 s + 2g_m)}$$

$$10.21 \quad \text{INVALID-ORDER-21} \quad Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{C_5 L_5 g_m s^2 - C_5 s + g_m}{C_5 s (C_1 s + 2g_m)}$$

$$10.22 \quad \text{INVALID-ORDER-22} \quad Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$$

$$H(s) = \frac{-C_5 L_5 s^2 + L_5 g_m s - 1}{(C_1 s + 2g_m) (C_5 L_5 s^2 + 1)}$$

$$10.23 \quad \text{INVALID-ORDER-23} \quad Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m}{C_5 s (C_1 s + 2g_m)}$$

$$10.24 \quad \text{INVALID-ORDER-24} \quad Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$$

$$H(s) = \frac{-C_5 L_5 R_5 s^2 + L_5 R_5 g_m s - L_5 s - R_5}{(C_1 s + 2g_m) (C_5 L_5 R_5 s^2 + L_5 s + R_5)}$$

$$10.25 \quad \text{INVALID-ORDER-25} \quad Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$$

$$H(s) = \frac{C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1}{(C_1 s + 2g_m) (C_5 L_5 s^2 + 1)}$$

$$10.26 \quad \text{INVALID-ORDER-26} \quad Z(s) = \left(\frac{1}{C_1 s}, \infty, \infty, \infty, \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$$

$$H(s) = \frac{C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 - C_5 R_5 s + R_5 g_m - 1}{(C_1 s + 2g_m) (C_5 L_5 s^2 + C_5 R_5 s + 1)}$$

$$10.27 \quad \text{INVALID-ORDER-27} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, R_5, \infty \right)$$

$$H(s) = \frac{R_1 (R_5 g_m - 1)}{C_1 R_1 s + 2R_1 g_m + 1}$$

$$10.28 \quad \text{INVALID-ORDER-28} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_1 (-C_5 s + g_m)}{C_5 s (C_1 R_1 s + 2R_1 g_m + 1)}$$

$$10.29 \quad \text{INVALID-ORDER-29} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_1 (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (C_1 R_1 s + 2R_1 g_m + 1)}$$

$$10.30 \quad \text{INVALID-ORDER-30} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_1 (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 s (C_1 R_1 s + 2R_1 g_m + 1)}$$

$$\mathbf{10.31 \quad INVALID-ORDER-31} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$$

$$H(s) = -\frac{R_1 (C_5 L_5 s^2 - L_5 g_m s + 1)}{(C_5 L_5 s^2 + 1) (C_1 R_1 s + 2 R_1 g_m + 1)}$$

$$\mathbf{10.32 \quad INVALID-ORDER-32} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{R_1 (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (C_1 R_1 s + 2 R_1 g_m + 1)}$$

$$\mathbf{10.33 \quad INVALID-ORDER-33} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$$

$$H(s) = -\frac{R_1 (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(C_1 R_1 s + 2 R_1 g_m + 1) (C_5 L_5 R_5 s^2 + L_5 s + R_5)}$$

$$\mathbf{10.34 \quad INVALID-ORDER-34} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$$

$$H(s) = \frac{R_1 (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(C_5 L_5 s^2 + 1) (C_1 R_1 s + 2 R_1 g_m + 1)}$$

$$\mathbf{10.35 \quad INVALID-ORDER-35} \quad Z(s) = \left(\frac{R_1}{C_1 R_1 s + 1}, \infty, \infty, \infty, \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$$

$$H(s) = -\frac{R_1 (-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(C_1 R_1 s + 2 R_1 g_m + 1) (C_5 L_5 s^2 + C_5 R_5 s + 1)}$$

$$\mathbf{10.36 \quad INVALID-ORDER-36} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, R_5, \infty \right)$$

$$H(s) = \frac{(R_5 g_m - 1) (C_1 R_1 s + 1)}{2 C_1 R_1 g_m s + C_1 s + 2 g_m}$$

$$\mathbf{10.37 \quad INVALID-ORDER-37} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = -\frac{(C_5 s - g_m) (C_1 R_1 s + 1)}{C_5 s (2 C_1 R_1 g_m s + C_1 s + 2 g_m)}$$

$$\mathbf{10.38 \quad INVALID-ORDER-38} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{(C_1 R_1 s + 1) (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2 C_1 R_1 g_m s + C_1 s + 2 g_m)}$$

$$\mathbf{10.39 \quad INVALID-ORDER-39} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{(C_1 R_1 s + 1) (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 s (2 C_1 R_1 g_m s + C_1 s + 2 g_m)}$$

$$10.40 \quad \text{INVALID-ORDER-40} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 R_1 s + 1) (C_5 L_5 s^2 - L_5 g_m s + 1)}{(C_5 L_5 s^2 + 1) (2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.41 \quad \text{INVALID-ORDER-41} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad L_5 s + R_5 + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{(C_1 R_1 s + 1) (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.42 \quad \text{INVALID-ORDER-42} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 R_1 s + 1) (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(2C_1 R_1 g_m s + C_1 s + 2g_m) (C_5 L_5 R_5 s^2 + L_5 s + R_5)}$$

$$10.43 \quad \text{INVALID-ORDER-43} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \quad \infty \right)$$

$$H(s) = \frac{(C_1 R_1 s + 1) (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(C_5 L_5 s^2 + 1) (2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.44 \quad \text{INVALID-ORDER-44} \quad Z(s) = \left(R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 R_1 s + 1) (-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(C_5 L_5 s^2 + C_5 R_5 s + 1) (2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.45 \quad \text{INVALID-ORDER-45} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = -\frac{(C_5 s - g_m) (C_1 L_1 s^2 + 1)}{C_5 s (2C_1 L_1 g_m s^2 + C_1 s + 2g_m)}$$

$$10.46 \quad \text{INVALID-ORDER-46} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5}{C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 s^2 + 1) (C_5 R_5 s - R_5 g_m + 1)}{(C_5 R_5 s + 1) (2C_1 L_1 g_m s^2 + C_1 s + 2g_m)}$$

$$10.47 \quad \text{INVALID-ORDER-47} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad R_5 + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{(C_1 L_1 s^2 + 1) (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2C_1 L_1 g_m s^2 + C_1 s + 2g_m)}$$

$$10.48 \quad \text{INVALID-ORDER-48} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad L_5 s + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{(C_1 L_1 s^2 + 1) (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 s (2C_1 L_1 g_m s^2 + C_1 s + 2g_m)}$$

$$10.49 \quad \text{INVALID-ORDER-49} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 s^2 + 1) (C_5 L_5 s^2 - L_5 g_m s + 1)}{(C_5 L_5 s^2 + 1) (2C_1 L_1 g_m s^2 + C_1 s + 2g_m)}$$

$$10.50 \quad \text{INVALID-ORDER-50} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad L_5 s + R_5 + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{(C_1 L_1 s^2 + 1) (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2C_1 L_1 g_m s^2 + C_1 s + 2g_m)}$$

$$10.51 \quad \text{INVALID-ORDER-51} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 s^2 + 1) (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(2C_1 L_1 g_m s^2 + C_1 s + 2g_m) (C_5 L_5 R_5 s^2 + L_5 s + R_5)}$$

$$10.52 \quad \text{INVALID-ORDER-52} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \quad \infty \right)$$

$$H(s) = \frac{(C_1 L_1 s^2 + 1) (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(C_5 L_5 s^2 + 1) (2C_1 L_1 g_m s^2 + C_1 s + 2g_m)}$$

$$10.53 \quad \text{INVALID-ORDER-53} \quad Z(s) = \left(L_1 s + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 s^2 + 1) (-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(C_5 L_5 s^2 + C_5 R_5 s + 1) (2C_1 L_1 g_m s^2 + C_1 s + 2g_m)}$$

$$10.54 \quad \text{INVALID-ORDER-54} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5}{C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 s (C_5 R_5 s - R_5 g_m + 1)}{(C_5 R_5 s + 1) (C_1 L_1 s^2 + 2L_1 g_m s + 1)}$$

$$10.55 \quad \text{INVALID-ORDER-55} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 s (C_5 L_5 s^2 - L_5 g_m s + 1)}{(C_5 L_5 s^2 + 1) (C_1 L_1 s^2 + 2L_1 g_m s + 1)}$$

$$10.56 \quad \text{INVALID-ORDER-56} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 s (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(C_1 L_1 s^2 + 2L_1 g_m s + 1) (C_5 L_5 R_5 s^2 + L_5 s + R_5)}$$

$$10.57 \quad \text{INVALID-ORDER-57} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \quad \infty \right)$$

$$H(s) = \frac{L_1 s (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(C_5 L_5 s^2 + 1) (C_1 L_1 s^2 + 2L_1 g_m s + 1)}$$

$$10.58 \quad \text{INVALID-ORDER-58} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1}, \infty, \infty, \infty, \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \infty \right)$$

$$H(s) = -\frac{L_1 s (-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(C_1 L_1 s^2 + 2L_1 g_m s + 1) (C_5 L_5 s^2 + C_5 R_5 s + 1)}$$

$$10.59 \quad \text{INVALID-ORDER-59} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = -\frac{(C_5 s - g_m) (C_1 L_1 s^2 + C_1 R_1 s + 1)}{C_5 s (2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.60 \quad \text{INVALID-ORDER-60} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 s^2 + C_1 R_1 s + 1) (C_5 R_5 s - R_5 g_m + 1)}{(C_5 R_5 s + 1) (2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.61 \quad \text{INVALID-ORDER-61} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{(C_1 L_1 s^2 + C_1 R_1 s + 1) (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.62 \quad \text{INVALID-ORDER-62} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{(C_1 L_1 s^2 + C_1 R_1 s + 1) (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 s (2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.63 \quad \text{INVALID-ORDER-63} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 s^2 + C_1 R_1 s + 1) (C_5 L_5 s^2 - L_5 g_m s + 1)}{(C_5 L_5 s^2 + 1) (2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.64 \quad \text{INVALID-ORDER-64} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \infty \right)$$

$$H(s) = \frac{(C_1 L_1 s^2 + C_1 R_1 s + 1) (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.65 \quad \text{INVALID-ORDER-65} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 s^2 + C_1 R_1 s + 1) (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(C_5 L_5 R_5 s^2 + L_5 s + R_5) (2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.66 \quad \text{INVALID-ORDER-66} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \infty \right)$$

$$H(s) = \frac{(C_1 L_1 s^2 + C_1 R_1 s + 1) (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(C_5 L_5 s^2 + 1) (2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.67 \quad \text{INVALID-ORDER-67} \quad Z(s) = \left(L_1 s + R_1 + \frac{1}{C_1 s}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5(C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 s^2 + C_1 R_1 s + 1)(-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(C_5 L_5 s^2 + C_5 R_5 s + 1)(2C_1 L_1 g_m s^2 + 2C_1 R_1 g_m s + C_1 s + 2g_m)}$$

$$10.68 \quad \text{INVALID-ORDER-68} \quad Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5}{C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 R_1 s (C_5 R_5 s - R_5 g_m + 1)}{(C_5 R_5 s + 1)(C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

$$10.69 \quad \text{INVALID-ORDER-69} \quad Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 R_1 s (C_5 L_5 s^2 - L_5 g_m s + 1)}{(C_5 L_5 s^2 + 1)(C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

$$10.70 \quad \text{INVALID-ORDER-70} \quad Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 R_1 s (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(C_5 L_5 R_5 s^2 + L_5 s + R_5)(C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

$$10.71 \quad \text{INVALID-ORDER-71} \quad Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \quad \infty \right)$$

$$H(s) = \frac{L_1 R_1 s (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(C_5 L_5 s^2 + 1)(C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

$$10.72 \quad \text{INVALID-ORDER-72} \quad Z(s) = \left(\frac{L_1 R_1 s}{C_1 L_1 R_1 s^2 + L_1 s + R_1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5(C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{L_1 R_1 s (-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(C_5 L_5 s^2 + C_5 R_5 s + 1)(C_1 L_1 R_1 s^2 + 2L_1 R_1 g_m s + L_1 s + R_1)}$$

$$10.73 \quad \text{INVALID-ORDER-73} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = -\frac{(C_5 s - g_m)(C_1 L_1 R_1 s^2 + L_1 s + R_1)}{C_5 s (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.74 \quad \text{INVALID-ORDER-74} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5}{C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_5 R_5 s - R_5 g_m + 1)(C_1 L_1 R_1 s^2 + L_1 s + R_1)}{(C_5 R_5 s + 1)(2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.75 \quad \text{INVALID-ORDER-75} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad R_5 + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{(C_1 L_1 R_1 s^2 + L_1 s + R_1)(C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.76 \quad \text{INVALID-ORDER-76} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad L_5 s + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{(C_1 L_1 R_1 s^2 + L_1 s + R_1) (C_5 L_5 g_m s^2 - C_5 s + g_m)}{C_5 s (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.77 \quad \text{INVALID-ORDER-77} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_5 L_5 s^2 - L_5 g_m s + 1) (C_1 L_1 R_1 s^2 + L_1 s + R_1)}{(C_5 L_5 s^2 + 1) (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.78 \quad \text{INVALID-ORDER-78} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad L_5 s + R_5 + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{(C_1 L_1 R_1 s^2 + L_1 s + R_1) (C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.79 \quad \text{INVALID-ORDER-79} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 R_5 s}{C_5 L_5 R_5 s^2 + L_5 s + R_5}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 R_1 s^2 + L_1 s + R_1) (C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5)}{(C_5 L_5 R_5 s^2 + L_5 s + R_5) (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.80 \quad \text{INVALID-ORDER-80} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \quad \infty \right)$$

$$H(s) = \frac{(C_1 L_1 R_1 s^2 + L_1 s + R_1) (C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1)}{(C_5 L_5 s^2 + 1) (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.81 \quad \text{INVALID-ORDER-81} \quad Z(s) = \left(\frac{L_1 s}{C_1 L_1 s^2 + 1} + R_1, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5 (C_5 L_5 s^2 + 1)}{C_5 L_5 s^2 + C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{(C_1 L_1 R_1 s^2 + L_1 s + R_1) (-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1)}{(C_5 L_5 s^2 + C_5 R_5 s + 1) (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + 2L_1 g_m s + 2R_1 g_m + 1)}$$

$$10.82 \quad \text{INVALID-ORDER-82} \quad Z(s) = \left(\frac{R_1 (C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = -\frac{R_1 (C_5 s - g_m) (C_1 L_1 s^2 + 1)}{C_5 s (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + C_1 R_1 s + 2R_1 g_m + 1)}$$

$$10.83 \quad \text{INVALID-ORDER-83} \quad Z(s) = \left(\frac{R_1 (C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad \infty, \quad \infty, \quad \frac{R_5}{C_5 R_5 s + 1}, \quad \infty \right)$$

$$H(s) = -\frac{R_1 (C_1 L_1 s^2 + 1) (C_5 R_5 s - R_5 g_m + 1)}{(C_5 R_5 s + 1) (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + C_1 R_1 s + 2R_1 g_m + 1)}$$

$$10.84 \quad \text{INVALID-ORDER-84} \quad Z(s) = \left(\frac{R_1 (C_1 L_1 s^2 + 1)}{C_1 L_1 s^2 + C_1 R_1 s + 1}, \quad \infty, \quad \infty, \quad \infty, \quad R_5 + \frac{1}{C_5 s}, \quad \infty \right)$$

$$H(s) = \frac{R_1 (C_1 L_1 s^2 + 1) (C_5 R_5 g_m s - C_5 s + g_m)}{C_5 s (2C_1 L_1 R_1 g_m s^2 + C_1 L_1 s^2 + C_1 R_1 s + 2R_1 g_m + 1)}$$

10.85 INVALID-ORDER-85 $Z(s) = \left(\frac{R_1(C_1L_1s^2+1)}{C_1L_1s^2+C_1R_1s+1}, \infty, \infty, \infty, L_5s + \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{R_1(C_1L_1s^2+1)(C_5L_5g_ms^2 - C_5s + g_m)}{C_5s(2C_1L_1R_1g_ms^2 + C_1L_1s^2 + C_1R_1s + 2R_1g_m + 1)}$$

10.86 INVALID-ORDER-86 $Z(s) = \left(\frac{R_1(C_1L_1s^2+1)}{C_1L_1s^2+C_1R_1s+1}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1}, \infty \right)$

$$H(s) = -\frac{R_1(C_1L_1s^2+1)(C_5L_5s^2 - L_5g_ms + 1)}{(C_5L_5s^2+1)(2C_1L_1R_1g_ms^2 + C_1L_1s^2 + C_1R_1s + 2R_1g_m + 1)}$$

10.87 INVALID-ORDER-87 $Z(s) = \left(\frac{R_1(C_1L_1s^2+1)}{C_1L_1s^2+C_1R_1s+1}, \infty, \infty, \infty, L_5s + R_5 + \frac{1}{C_5s}, \infty \right)$

$$H(s) = \frac{R_1(C_1L_1s^2+1)(C_5L_5g_ms^2 + C_5R_5g_ms - C_5s + g_m)}{C_5s(2C_1L_1R_1g_ms^2 + C_1L_1s^2 + C_1R_1s + 2R_1g_m + 1)}$$

10.88 INVALID-ORDER-88 $Z(s) = \left(\frac{R_1(C_1L_1s^2+1)}{C_1L_1s^2+C_1R_1s+1}, \infty, \infty, \infty, \frac{L_5R_5s}{C_5L_5R_5s^2+L_5s+R_5}, \infty \right)$

$$H(s) = -\frac{R_1(C_1L_1s^2+1)(C_5L_5R_5s^2 - L_5R_5g_ms + L_5s + R_5)}{(C_5L_5R_5s^2 + L_5s + R_5)(2C_1L_1R_1g_ms^2 + C_1L_1s^2 + C_1R_1s + 2R_1g_m + 1)}$$

10.89 INVALID-ORDER-89 $Z(s) = \left(\frac{R_1(C_1L_1s^2+1)}{C_1L_1s^2+C_1R_1s+1}, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \infty \right)$

$$H(s) = \frac{R_1(C_1L_1s^2+1)(C_5L_5R_5g_ms^2 - C_5L_5s^2 + L_5g_ms + R_5g_m - 1)}{(C_5L_5s^2+1)(2C_1L_1R_1g_ms^2 + C_1L_1s^2 + C_1R_1s + 2R_1g_m + 1)}$$

10.90 INVALID-ORDER-90 $Z(s) = \left(\frac{R_1(C_1L_1s^2+1)}{C_1L_1s^2+C_1R_1s+1}, \infty, \infty, \infty, \frac{R_5(C_5L_5s^2+1)}{C_5L_5s^2+C_5R_5s+1}, \infty \right)$

$$H(s) = -\frac{R_1(C_1L_1s^2+1)(-C_5L_5R_5g_ms^2 + C_5L_5s^2 + C_5R_5s - R_5g_m + 1)}{(C_5L_5s^2 + C_5R_5s + 1)(2C_1L_1R_1g_ms^2 + C_1L_1s^2 + C_1R_1s + 2R_1g_m + 1)}$$

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