Filter Summary Report: TIA,simple,Z5,ZL

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3	BP 3.1 BF 3.2 BF	$P-1 \ Z(s) = \left(\infty, \ \infty, \ \infty, \ \infty, \ R_5, \ \frac{L_L s}{C_L L_L s^2 + 1}\right) $ $P-2 \ Z(s) = \left(\infty, \ \infty, \ \infty, \ \infty, \ R_5, \ \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right) $
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6	GE 6.1 GE	$E-1 Z(s) = \left(\infty, \infty, \infty, \infty, R_5, L_L s + R_L + \frac{1}{C_L s}\right) \dots \dots$
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10.16 INVALID-ORDER-16 $Z(s) = \Big($	$(\infty, \infty, \infty$	$\frac{R_5}{C_5R_5s+1}, \overline{C}$	$\frac{L_L s}{C_L L_L s^2 + 1}$		 	 	 	19
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10.18INVALID-ORDER-18 $Z(s) = \Big($	$(\infty, \ \infty, \$	$\frac{R_5}{C_5R_5s+1},$	$\frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}$)	 	 	 	20
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10.23INVALID-ORDER-23 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty,$	$R_5 + \frac{1}{C_5 s},$	$R_L + \frac{1}{C_L s}$		 	 	 	21
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10.25INVALID-ORDER-25 $Z(s) = \left(\right.$	$(\infty, \infty, \infty, \infty, \infty,$	$R_5 + \frac{1}{C_5 s},$	$\frac{L_L s}{C_L L_L s^2 + 1} \bigg) \qquad \cdot$		 	 	 	21
10.26INVALID-ORDER-26 $Z(s) = ($	$(\infty, \infty, \infty$	$R_5 + \frac{1}{C_5 s},$	$L_L s + R_L + \epsilon$	$\left(\frac{1}{C_L s}\right)$	 	 	 	21
10.27INVALID-ORDER-27 $Z(s) = \left(\right.$	$\stackrel{\prime}{\infty}, \ \infty, \ \infty, \ \infty, \ \infty,$	$R_5 + \frac{1}{C_5 s},$	$\frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}$	\cdot)	 	 	 	21
10.28INVALID-ORDER-28 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty,$	$R_5 + \frac{1}{C_5 s},$	$\frac{L_L s}{C_L L_L s^2 + 1} + I$	R_L)	 	 	 	21
10.29INVALID-ORDER-29 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty,$	$R_5 + \frac{1}{C_5 s},$	$\frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}$	$\left(\frac{1}{2}\right)$	 	 	 	22
10.30INVALID-ORDER-30 $Z(s) = ($	(∞, ∞, ∞)	$L_5s + \frac{1}{C_5s},$	$\frac{1}{C_L s}$)		 	 	 	22
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10.32INVALID-ORDER-32 $Z(s) = ($	$(\infty, \infty, \infty$	$L_5 s + \frac{1}{C_5 s},$	$R_L + \frac{1}{C_L s}$		 	 	 	22
10.33INVALID-ORDER-33 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty,$	$L_5 s + \frac{1}{C_5 s},$	$L_L s + \frac{1}{C_L s}$		 	 	 	22

10.34INVALID-ORDER-34 $Z(s) = 0$	(∞, ∞, ∞)	∞ , ∞ ,	$L_5 s + \frac{1}{C_5 s},$	$, \frac{L_L s}{C_L L_L s^2}$	$\overline{+1}$) .			 	 	 	 	 	23
10.35INVALID-ORDER-35 $Z(s) = 0$	$\left(\infty, \ \infty, \ \infty\right)$	∞ , ∞ ,	$L_5s + \frac{1}{C_5s},$	$, L_L s +$	$R_L + \frac{1}{C_L}$	$\frac{1}{L^s}$		 	 	 	 	 	23
10.36INVALID-ORDER-36 $Z(s) =$	$\left(\infty, \ \infty, \ \infty\right)$	∞ , ∞ ,	$L_5s + \frac{1}{C_5s}$	$, \frac{1}{C_L s + \frac{1}{R}}$	$\left(\frac{1}{L} + \frac{1}{L_L s}\right)$			 	 	 	 	 	23
10.37INVALID-ORDER-37 $Z(s) = 0$	(∞, ∞, ∞)	∞ , ∞ ,	$L_5 s + \frac{1}{C_5 s},$	$, \frac{L_L s}{C_L L_L s^2}$	$\frac{1}{1} + R_1$	L) .		 	 	 	 	 	23
10.38INVALID-ORDER-38 $Z(s) =$	$\left(\infty, \ \infty, \ \infty\right)$	∞ , ∞ ,	$L_5 s + \frac{1}{C_5 s}$	$, \frac{R_L \left(L_L + \frac{L_L + L_L}{L_L s + R}\right)}{L_L s + R}$	$\left(\frac{s + \frac{1}{C_L s}}{C_L + \frac{1}{C_L s}}\right)$)		 	 	 	 	 	23
10.39INVALID-ORDER-39 $Z(s) = 1$	/			\				 	 	 	 	 	24
10.40INVALID-ORDER-40 $Z(s) = 0$	(∞, ∞, ∞)	∞ , ∞ ,	$\tfrac{L_5s}{C_5L_5s^2+1},$	$\frac{R_L}{C_L R_L s + 1}$	$\bar{\mathfrak{l}}$			 	 	 	 	 	24
10.41INVALID-ORDER-41 $Z(s) = 0$	$\Big(\infty, \ \infty, \ \infty$	∞ , ∞ ,	$\tfrac{L_5s}{C_5L_5s^2+1},$	$R_L + \frac{1}{C_L}$	$\left(\frac{1}{\sqrt{s}}\right)$			 	 	 	 	 	24
10.42INVALID-ORDER-42 $Z(s) = 0$	$\left(\infty, \ \infty, \ \infty\right)$	∞ , ∞ ,	$\frac{L_5s}{C_5L_5s^2+1},$	$L_L s + \overline{c}$	$\left(\frac{1}{C_L s}\right)$.			 	 	 	 	 	24
10.43INVALID-ORDER-43 $Z(s) = 0$	$\left(\infty, \ \infty, \ \infty\right)$	∞ , ∞ ,	$\frac{L_5s}{C_5L_5s^2+1},$	$\frac{L_L s}{C_L L_L s^2 +}$	$\overline{-1}$)			 	 	 	 	 	24
10.44INVALID-ORDER-44 $Z(s) = 0$	(∞, ∞, ∞)	∞ , ∞ ,	$\tfrac{L_5s}{C_5L_5s^2+1},$	$L_L s + R$	$R_L + \frac{1}{C_L}$	\overline{s} .		 	 	 	 	 	24
10.45INVALID-ORDER-45 $Z(s) =$	$\left(\infty, \ \infty, \ \infty\right)$	∞ , ∞ ,	$\frac{L_5s}{C_5L_5s^2+1},$	$\frac{1}{C_L s + \frac{1}{R_L}}$	$\overline{+\frac{1}{L_L^s}}$			 	 	 	 	 	25
10.46INVALID-ORDER-46 $Z(s) = 0$	(∞, ∞, ∞)	∞ , ∞ ,	$\frac{L_5s}{C_5L_5s^2+1},$	$\frac{L_L s}{C_L L_L s^2 +}$	$\frac{1}{1} + R_L$)		 	 	 	 	 	25
10.47INVALID-ORDER-47 $Z(s) =$	$\left(\infty, \ \infty, \ \infty\right)$	∞ , ∞ ,	$\frac{L_5s}{C_5L_5s^2+1},$	$\frac{R_L \left(L_L s - L_L s + R_L \right)}{L_L s + R_L}$	$\left(\frac{+\frac{1}{C_L s}}{+\frac{1}{C_L s}}\right)$			 	 	 	 	 	25
10.48INVALID-ORDER-48 $Z(s) = 1$								 	 	 	 	 	25
10.49INVALID-ORDER-49 $Z(s) = 1$	(∞, ∞, ∞)	∞ , ∞ ,	$L_5s + R_5$	$+\frac{1}{C_5s}, \ \overline{C}$	$\frac{R_L}{R_L s + 1}$)		 	 	 	 	 	25
10.50INVALID-ORDER-50 $Z(s) = 0$	(∞, ∞, ∞)	∞ , ∞ ,	L_5s+R_5	$+\frac{1}{C_5s}$, F_6	$R_L + \frac{1}{C_L s}$	$\left(\frac{1}{s}\right)$.		 	 	 	 	 	26
10.51INVALID-ORDER-51 $Z(s) = 0$	(∞, ∞, ∞)	∞ , ∞ ,	$L_5s + R_5$ -	$+\frac{1}{C_5s}, L$	$c_L s + \frac{1}{C_L}$	$\left(\frac{1}{2s}\right)$.		 	 	 	 	 	26
10.52INVALID-ORDER-52 $Z(s) = 0$	(∞, ∞, ∞)	∞ , ∞ ,	$L_5s + R_5$ -	$+\frac{1}{C_5s}, \ \overline{C}$	$\frac{L_L s}{L_L L_L s^2 + 1}$	$\left(\frac{1}{2} \right)^{\prime}$.		 	 	 	 	 	26
10.53INVALID-ORDER-53 $Z(s) = 1$	>					,	$\left(\frac{1}{\sqrt{s}}\right)$	 	 	 	 	 	26
10.54INVALID-ORDER-54 $Z(s) =$	(∞, ∞, ∞)	∞ , ∞ ,	$L_5s + R_5$	$+\frac{1}{C_5s}, \ \overline{C}$	$\frac{1}{C_L s + \frac{1}{R_L}} +$	$\left(\frac{1}{L_L s}\right)$		 	 	 	 	 	26
10.55INVALID-ORDER-55 $Z(s) = 1$	(∞, ∞, ∞)	∞ , ∞ ,	$L_5s + R_5$	$+\frac{1}{C_5s}, \ \overline{C}$	$\frac{L_L s}{C_L L_L s^2 + 1}$	$1 + R_{I}$	L) .	 	 	 	 	 	27

10.56INVALID-ORDER-56 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$L_5 s + R_5 + \frac{1}{C_5 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}$	 	27
10.57INVALID-ORDER-57 $Z(s) = 1$	/		 	27
10.58INVALID-ORDER-58 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{R_L}{C_L R_L s + 1}$	 	27
10.59INVALID-ORDER-59 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{1}{C_5s+\frac{1}{R_5}+\frac{1}{L_5s}}, \ R_L+\frac{1}{C_Ls}$	 	27
10.60INVALID-ORDER-60 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{1}{C_5s+\frac{1}{R_5}+\frac{1}{L_5s}}, L_Ls+\frac{1}{C_Ls}$	 	28
10.61INVALID-ORDER-61 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{1}{C_5s + \frac{1}{R_5} + \frac{1}{L_5s}}, \ \frac{L_Ls}{C_LL_Ls^2 + 1}$	 	28
10.62INVALID-ORDER-62 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, L_L s + R_L + \frac{1}{C_L s}$	 	28
10.63INVALID-ORDER-63 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{1}{C_5s + \frac{1}{R_5} + \frac{1}{L_5s}}, \frac{1}{C_Ls + \frac{1}{R_L} + \frac{1}{L_Ls}}$	 	28
10.64INVALID-ORDER-64 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L$	 	28
10.65INVALID-ORDER-65 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}$	 	29
10.66INVALID-ORDER-66 $Z(s) = ($			 	29
10.67INVALID-ORDER-67 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty,$	$\frac{L_5s}{C_5L_5s^2+1} + R_5, \ \frac{R_L}{C_LR_Ls+1}$	 	29
10.68INVALID-ORDER-68 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty)$	$\frac{L_{5s}}{C_5L_5s^2+1} + R_5, \ R_L + \frac{1}{C_Ls}$	 	29
10.69INVALID-ORDER-69 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty)$	$\frac{L_5s}{C_5L_5s^2+1} + R_5$, $L_Ls + \frac{1}{C_Ls}$	 	29
10.70INVALID-ORDER-70 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty,$	$\frac{L_5s}{C_5L_5s^2+1} + R_5, \ \frac{L_Ls}{C_LL_Ls^2+1}$	 	30
10.71INVALID-ORDER-71 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty, \infty)$	$\frac{L_5s}{C_5L_5s^2+1} + R_5$, $L_Ls + R_L + \frac{1}{C_Ls}$	 	30
10.72INVALID-ORDER-72 $Z(s) = 1$	∞ , ∞ , ∞ , ∞ ,	$\frac{L_5s}{C_5L_5s^2+1} + R_5, \ \frac{1}{C_Ls + \frac{1}{R_L} + \frac{1}{L_Ls}} $	 	30
10.73INVALID-ORDER-73 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty, \infty)$	$\frac{L_5s}{C_5L_5s^2+1} + R_5, \ \frac{L_Ls}{C_LL_Ls^2+1} + \hat{R_L}$	 	30
10.74INVALID-ORDER-74 $Z(s) = 1$	$\left(\infty, \ \infty, \ \infty, \ \infty, \ \infty, \right.$	$\frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}$	 	30

		$rac{R_5\left(L_5 s + rac{1}{C_5 s} ight)}{L_5 s + R_5 + rac{1}{C_5 s}}, \; rac{1}{C_L s} ight) \;\; \ldots \;\;$	
		$rac{R_5\left(L_5 s + rac{1}{C_5 s} ight)}{L_5 s + R_5 + rac{1}{C_5 s}}, \; rac{R_L}{C_L R_L s + 1} ight) \;\; \ldots \;\; \ldots \;\; \ldots \;\; \ldots$	
		$\frac{R_5\left(L_5s + \frac{1}{C_5s}\right)}{L_5s + R_5 + \frac{1}{C_5s}}, \ R_L + \frac{1}{C_Ls}$	
10.78 INVALID-ORDER-78 $Z(s)=\left(\right.$	$(\infty, \infty, \infty, \infty, \infty,$	$\frac{R_5\left(L_5s + \frac{1}{C_5s}\right)}{L_5s + R_5 + \frac{1}{C_5s}}, \ L_Ls + \frac{1}{C_Ls}$	31
		$\frac{R_5\left(L_5 s + \frac{1}{C_5 s}\right)}{L_5 s + R_5 + \frac{1}{C_5 s}}, \frac{L_L s}{C_L L_L s^2 + 1}$	
		$\frac{R_5\left(L_5s + \frac{1}{C_5s}\right)}{L_5s + R_5 + \frac{1}{C_5s}}, \ L_Ls + R_L + \frac{1}{C_Ls}$	
10.81 INVALID-ORDER-81 $Z(s)=\left(\right.$	$(\infty, \infty, \infty, \infty, \infty,$	$\frac{R_5\left(L_5 s + \frac{1}{C_5 s}\right)}{L_5 s + R_5 + \frac{1}{C_5 s}}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$	32
10.82INVALID-ORDER-82 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty,$	$\frac{R_5\left(L_5s+rac{1}{C_5s} ight)}{L_5c_1+R_2+rac{1}{C_5}}, \; rac{L_Ls}{C_LL_5s^2+1}+R_L$	32
10.83INVALID-ORDER-83 $Z(s) = ($	$(\infty, \infty, \infty, \infty, \infty,$	$\frac{R_{5}\left(L_{5}s+\frac{1}{C_{5}s}\right)}{L_{5}s+R_{5}+\frac{1}{C_{5}s}}, \frac{R_{L}\left(L_{L}s+\frac{1}{C_{L}s}\right)}{L_{L}s+R_{L}+\frac{1}{C_{L}s}}\right)}{L_{L}s+R_{L}+\frac{1}{C_{L}s}}\right) \dots $	32

1 Examined H(z) for TIA simple Z5 ZL: $\frac{Z_L(Z_5g_m-1)}{Z_5g_m+2Z_Lg_m+1}$

$$H(z) = \frac{Z_L (Z_5 g_m - 1)}{Z_5 g_m + 2 Z_L g_m + 1}$$

- 2 HP
- 3 BP
- 3.1 BP-1 $Z(s) = \left(\infty, \infty, \infty, \infty, R_5, \frac{L_L s}{C_L L_L s^2 + 1}\right)$

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

$$\begin{array}{l} \text{Q: } \frac{C_L \sqrt{\frac{1}{C_L L_L}} (R_5 g_m + 1)}{2g_m} \\ \text{wo: } \sqrt{\frac{1}{C_L L_L}} \\ \text{bandwidth: } \frac{2g_m}{C_L (R_5 g_m + 1)} \\ \text{K-LP: 0} \\ \text{K-HP: 0} \\ \text{K-BP: } \frac{R_5 g_m - 1}{2g_m} \\ \text{Qz: 0} \\ \text{Wz: None} \end{array}$$

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

$$H(s) = \frac{L_L R_L s \left(R_5 g_m - 1\right)}{C_L L_L R_5 R_L g_m s^2 + C_L L_L R_L s^2 + L_L R_5 g_m s + 2L_L R_L g_m s + L_L s + R_5 R_L g_m + R_L}$$

$$\begin{array}{l} \text{Q:} \ \frac{C_L R_L \sqrt{\frac{1}{C_L L_L}} (R_5 g_m + 1)}{R_5 g_m + 2 R_L g_m + 1} \\ \text{wo:} \ \sqrt{\frac{1}{C_L L_L}} \\ \text{bandwidth:} \ \frac{R_5 g_m + 2 R_L g_m + 1}{C_L R_L (R_5 g_m + 1)} \\ \text{K-LP:} \ 0 \\ \text{K-HP:} \ 0 \\ \text{K-BP:} \ \frac{R_L (R_5 g_m - 1)}{R_5 g_m + 2 R_L g_m + 1} \\ \text{Qz:} \ 0 \\ \text{Wz:} \ \text{None} \end{array}$$

4 LP

5 BS

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

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

$$\begin{array}{l} \text{Q:} \ \frac{2L_{L}g_{m}\sqrt{\frac{1}{C_{L}L_{L}}}}{R_{5}g_{m}+1} \\ \text{wo:} \ \sqrt{\frac{1}{C_{L}L_{L}}} \\ \text{bandwidth:} \ \frac{R_{5}g_{m}+1}{2L_{L}g_{m}} \\ \text{K-LP:} \ \frac{R_{5}g_{m}-1}{2g_{m}} \\ \text{K-HP:} \ \frac{R_{5}g_{m}-1}{2g_{m}} \\ \text{K-BP:} \ 0 \\ \text{Qz:} \ \text{None} \\ \text{Wz:} \ \sqrt{\frac{1}{C_{L}L_{L}}} \end{array}$$

5.2 BS-2
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5, \frac{R_L\left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = \frac{R_L\left(R_5 g_m - 1\right)\left(C_L L_L s^2 + 1\right)}{C_L L_L R_5 g_m s^2 + 2C_L L_L R_L g_m s^2 + C_L L_L s^2 + C_L R_5 R_L g_m s + C_L R_L s + R_5 g_m + 2R_L g_m + 1}$$

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

6 **GE**

6.1 GE-1
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5, L_L s + R_L + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{(R_5 g_m - 1) (C_L L_L s^2 + C_L R_L s + 1)}{2C_L L_L g_m s^2 + C_L R_5 g_m s + 2C_L R_L g_m s + C_L s + 2g_m}$$

$$\begin{aligned} &\text{Q: } \frac{2L_{L}g_{m}\sqrt{\frac{1}{C_{L}L_{L}}}}{R_{5}g_{m}+2R_{L}g_{m}+1} \\ &\text{wo: } \sqrt{\frac{1}{C_{L}L_{L}}} \\ &\text{bandwidth: } \frac{R_{5}g_{m}+2R_{L}g_{m}+1}{2L_{L}g_{m}} \end{aligned}$$

$$\begin{array}{l} \text{K-LP: } \frac{R_5g_m-1}{2g_m} \\ \text{K-HP: } \frac{R_5g_m-1}{2g_m} \\ \text{K-BP: } \frac{R_L(R_5g_m-1)}{R_5g_m+2R_Lg_m+1} \\ \text{Qz: } \frac{L_L\sqrt{\frac{1}{C_LL_L}}}{R_L} \\ \text{Wz: } \sqrt{\frac{1}{C_LL_L}} \end{array}$$

6.2 GE-2
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = \frac{\left(R_5 g_m - 1\right) \left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_L L_L R_5 g_m s^2 + 2C_L L_L R_L g_m s^2 + C_L L_L s^2 + 2L_L g_m s + R_5 g_m + 2R_L g_m + 1}$$

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

6.3 GE-3
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, R_L\right)$$

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

Q:
$$\frac{L_5 g_m \sqrt{\frac{1}{C_5 L_5}}}{2R_L g_m + 1}$$

wo:
$$\sqrt{\frac{1}{C_5L_5}}$$
 bandwidth: $\frac{2R_Lg_m+1}{L_5g_m}$ K-LP: R_L K-HP: R_L K-BP: $-\frac{R_L}{2R_Lg_m+1}$ Qz: $-L_5g_m\sqrt{\frac{1}{C_5L_5}}$ Wz: $\sqrt{\frac{1}{C_5L_5}}$

6.4 GE-4
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, R_L\right)$$

$$H(s) = \frac{R_L \left(-C_5 L_5 s^2 + L_5 g_m s - 1 \right)}{2C_5 L_5 R_L q_m s^2 + C_5 L_5 s^2 + L_5 q_m s + 2R_L q_m + 1}$$

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

6.5 GE-5
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, R_L\right)$$

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

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

6.6 GE-6
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, R_L\right)$$

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

$$\begin{aligned} &\text{Q:} \ \frac{C_5R_5\sqrt{\frac{1}{C_5L_5}}(2R_Lg_m+1)}{R_5g_m+2R_Lg_m+1} \\ &\text{Wo:} \ \sqrt{\frac{1}{C_5L_5}} \\ &\text{bandwidth:} \ \frac{R_5g_m+2R_Lg_m+1}{C_5R_5(2R_Lg_m+1)} \\ &\text{K-LP:} \ -\frac{R_L}{2R_Lg_m+1} \\ &\text{K-HP:} \ -\frac{R_L}{2R_Lg_m+1} \\ &\text{K-BP:} \ \frac{R_L(R_5g_m-1)}{R_5g_m+2R_Lg_m+1} \\ &\text{Qz:} \ -\frac{C_5R_5\sqrt{\frac{1}{C_5L_5}}}{R_5g_m-1} \\ &\text{Wz:} \ \sqrt{\frac{1}{C_5L_5}} \end{aligned}$$

6.7 GE-7
$$Z(s) = \left(\infty, \ \infty, \ \infty, \ \infty, \ \frac{L_5s}{C_5L_5s^2+1} + R_5, \ R_L\right)$$

$$H(s) = \frac{R_L\left(C_5L_5R_5g_ms^2 - C_5L_5s^2 + L_5g_ms + R_5g_m - 1\right)}{C_5L_5R_5g_ms^2 + 2C_5L_5R_Lg_ms^2 + C_5L_5s^2 + L_5g_ms + R_5g_m + 2R_Lg_m + 1}$$

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

6.8 GE-8
$$Z(s) = \left(\infty, \ \infty, \ \infty, \ \infty, \ \frac{R_5\left(L_5s + \frac{1}{C_5s}\right)}{L_5s + R_5 + \frac{1}{C_5s}}, \ R_L\right)$$

$$H(s) = \frac{R_L\left(C_5L_5R_5g_ms^2 - C_5L_5s^2 - C_5R_5s + R_5g_m - 1\right)}{C_5L_5R_5g_ms^2 + 2C_5L_5R_Lg_ms^2 + C_5L_5s^2 + 2C_5R_5R_Lg_ms + C_5R_5s + R_5g_m + 2R_Lg_m + 1}$$

$$\begin{aligned} & \text{Q:} \ \frac{L_5\sqrt{\frac{1}{C_5L_5}}(R_5g_m + 2R_Lg_m + 1)}{R_5(2R_Lg_m + 1)} \\ & \text{wo:} \ \sqrt{\frac{1}{C_5L_5}} \\ & \text{bandwidth:} \ \frac{R_5(2R_Lg_m + 1)}{L_5(R_5g_m + 2R_Lg_m + 1)} \\ & \text{K-LP:} \ \frac{R_L(R_5g_m - 1)}{R_5g_m + 2R_Lg_m + 1} \\ & \text{K-HP:} \ \frac{R_L(R_5g_m - 1)}{R_5g_m + 2R_Lg_m + 1} \\ & \text{K-BP:} \ -\frac{R_L}{2R_Lg_m + 1} \\ & \text{Qz:} \ \frac{L_5\sqrt{\frac{1}{C_5L_5}}(-R_5g_m + 1)}{R_5} \\ & \text{Wz:} \ \sqrt{\frac{1}{C_5L_5}} \end{aligned}$$

7 AP

INVALID-NUMER

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

$$H(s) = \frac{R_L \left(-C_5 s + g_m \right)}{C_5 C_L R_L s^2 + 2 C_5 R_L g_m s + C_5 s + C_L R_L g_m s + g_m}$$

Parameters:

Q: $\frac{C_5C_LR_L\sqrt{\frac{g_m}{C_5C_LR_L}}}{2C_5R_Lg_m+C_5+C_LR_Lg_m}$ wo: $\sqrt{\frac{g_m}{C_5C_LR_L}}$ bandwidth: $\frac{2C_5R_Lg_m+C_5+C_LR_Lg_m}{C_5C_LR_L}$

K-LP: R_L K-HP: 0

K-BP: $-\frac{C_5R_L}{2C_5R_Lg_m+C_5+C_LR_Lg_m}$ Qz: 0

Wz: None

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

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

Parameters:

Q: $\frac{\sqrt{2}C_5C_LR_5\sqrt{\frac{g_m}{C_5C_LR_5}}}{2C_5R_5g_m+C_LR_5g_m+C_L}$

wo: $\sqrt{2}\sqrt{\frac{g_m}{C_5C_LR_5}}$ bandwidth: $\frac{2C_5R_5g_m+C_LR_5g_m+C_L}{C_5C_LR_5}$ K-LP: $\frac{R_5g_m-1}{2g_m}$

K-HP: 0
K-BP:
$$-\frac{C_5R_5}{2C_5R_5g_m+C_LR_5g_m+C_L}$$
 Qz: 0
Wz: None

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

$$H(s) = \frac{R_L \left(-C_5 R_5 s + R_5 g_m - 1 \right)}{C_5 C_L R_5 R_L s^2 + 2 C_5 R_5 R_L g_m s + C_5 R_5 s + C_L R_5 R_L g_m s + C_L R_L s + R_5 g_m + 2 R_L g_m + 1}$$

Parameters:

Q:
$$\frac{C_5C_LR_5R_L\sqrt{\frac{R_5g_m+2R_Lg_m+1}{C_5C_LR_5R_L}}}{\frac{1}{2C_5R_5R_Lg_m+C_5R_5+C_LR_5R_Lg_m+1}}$$
 wo:
$$\sqrt{\frac{R_5g_m+2R_Lg_m+1}{C_5C_LR_5R_L}}$$
 bandwidth:
$$\frac{2C_5R_5R_Lg_m+C_5R_5+C_LR_5R_Lg_m+C_LR_L}{C_5C_LR_5R_L}}$$
 K-LP:
$$\frac{R_L(R_5g_m-1)}{R_5g_m+2R_Lg_m+1}$$
 K-HP:
$$0$$
 K-BP:
$$-\frac{C_5R_5R_L}{2C_5R_5R_Lg_m+C_5R_5+C_LR_5R_Lg_m+C_LR_L}}$$
 Qz:
$$0$$
 Wz: None

8.4 INVALID-NUMER-4 $Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \frac{R_L}{C_L R_L s + 1}\right)$

$$H(s) = \frac{R_L \left(C_5 R_5 g_m s - C_5 s + g_m \right)}{C_5 C_L R_5 R_L g_m s^2 + C_5 C_L R_L s^2 + C_5 R_5 g_m s + 2 C_5 R_L g_m s + C_5 s + C_L R_L g_m s + g_m}$$

$$\begin{aligned} &\text{Q:} \ \frac{C_5C_LR_L\sqrt{\frac{g_m}{C_5C_LR_L(R_5g_m+1)}}(R_5g_m+1)}{C_5R_5g_m+2C_5R_Lg_m+C_5+C_LR_Lg_m} \\ &\text{wo:} \ \sqrt{\frac{g_m}{C_5C_LR_L(R_5g_m+1)}} \\ &\text{bandwidth:} \ \frac{C_5R_5g_m+2C_5R_Lg_m+C_5+C_LR_Lg_m}{C_5C_LR_L(R_5g_m+1)} \\ &\text{K-LP:} \ R_L \\ &\text{K-HP:} \ 0 \end{aligned}$$

K-BP:
$$\frac{C_5R_L(R_5g_m-1)}{C_5R_5g_m+2C_5R_Lg_m+C_5+C_LR_Lg_m}$$
 Qz: 0 Wz: None

9 INVALID-WZ

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

$$H(s) = -\frac{\left(C_L R_L s + 1\right) \left(C_5 R_5 s - R_5 g_m + 1\right)}{2C_5 C_L R_5 R_L g_m s^2 + C_5 C_L R_5 s^2 + 2C_5 R_5 g_m s + C_L R_5 g_m s + 2C_L R_L g_m s + C_L s + 2g_m}$$

Parameters:

$$\begin{aligned} & \text{Q:} \ \frac{\sqrt{2}C_5C_LR_5\sqrt{\frac{g_m}{C_5C_LR_5(2R_Lg_m+1)}}(2R_Lg_m+1)}{2C_5R_5g_m+C_LR_5g_m+2C_LR_Lg_m+C_L} \\ & \text{wo:} \ \sqrt{2}\sqrt{\frac{g_m}{C_5C_LR_5(2R_Lg_m+1)}} \\ & \text{bandwidth:} \ \frac{2C_5R_5g_m+C_LR_5g_m+2C_LR_Lg_m+C_L}{C_5C_LR_5(2R_Lg_m+1)} \\ & \text{K-LP:} \ \frac{R_5g_m-1}{2g_m} \\ & \text{K-HP:} \ -\frac{R_L}{2R_Lg_m+1} \\ & \text{K-BP:} \ \frac{-C_5R_5+C_LR_5R_Lg_m-C_LR_L}{2C_5C_LR_5g_m+C_LR_5g_m+2C_LR_Lg_m+C_L} \\ & \text{Qz:} \ \frac{\sqrt{2C_5C_LR_5R_L}\sqrt{\frac{g_m}{C_5C_LR_5(2R_Lg_m+1)}}}{C_5R_5-C_LR_5R_Lg_m+C_LR_L} \\ & \text{Wz:} \ \sqrt{\frac{-R_5g_m+1}{C_5C_LR_5R_L}} \end{aligned}$$

10 INVALID-ORDER

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

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

10.2 INVALID-ORDER-2
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5, \frac{1}{C_L s}\right)$$

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

10.3 INVALID-ORDER-3
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5, \frac{R_L}{C_L R_L s + 1}\right)$$

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

10.4 INVALID-ORDER-4
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5, R_L + \frac{1}{C_L s}\right)$$

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

10.5 INVALID-ORDER-5
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s}, R_L\right)$$

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

10.6 INVALID-ORDER-6
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s}, \frac{1}{C_L s}\right)$$

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

10.7 INVALID-ORDER-7
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s}, R_L + \frac{1}{C_L s}\right)$$

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

10.8 INVALID-ORDER-8
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s}, L_L s + \frac{1}{C_L s}\right)$$

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

10.9 INVALID-ORDER-9
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s}, \frac{L_L s}{C_L L_L s^2 + 1}\right)$$

$$H(s) = \frac{L_L s \left(-C_5 s + g_m\right)}{C_5 C_L L_L s^3 + 2C_5 L_L g_m s^2 + C_5 s + C_L L_L g_m s^2 + g_m}$$

10.10 INVALID-ORDER-10
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s}, L_L s + R_L + \frac{1}{C_L s}\right)$$

$$H(s) = -\frac{(C_5 s - g_m) (C_L L_L s^2 + C_L R_L s + 1)}{s (2C_5 C_L L_L g_m s^2 + 2C_5 C_L R_L g_m s + C_5 C_L s + 2C_5 g_m + C_L g_m)}$$

10.11 INVALID-ORDER-11
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(-C_5 s + g_m\right)}{C_5 C_L L_L R_L s^3 + 2 C_5 L_L R_L g_m s^2 + C_5 L_L s^2 + C_5 R_L s + C_L L_L R_L g_m s^2 + L_L g_m s + R_L g_m}$$

10.12 INVALID-ORDER-12
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = -\frac{\left(C_{5}s - g_{m}\right)\left(C_{L}L_{L}R_{L}s^{2} + L_{L}s + R_{L}\right)}{2C_{5}C_{L}L_{L}R_{L}g_{m}s^{3} + C_{5}C_{L}L_{L}s^{3} + 2C_{5}L_{L}g_{m}s^{2} + 2C_{5}R_{L}g_{m}s + C_{5}s + C_{L}L_{L}g_{m}s^{2} + g_{m}}$$

10.13 INVALID-ORDER-13
$$Z(s) = \left(\infty, \ \infty, \ \infty, \ \frac{1}{C_5 s}, \ \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = -\frac{R_L \left(C_5 s - g_m\right) \left(C_L L_L s^2 + 1\right)}{2C_5 C_L L_L R_L g_m s^3 + C_5 C_L L_L s^3 + C_5 C_L R_L s^2 + 2C_5 R_L g_m s + C_5 s + C_L L_L g_m s^2 + C_L R_L g_m s + g_m}$$

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

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

10.15 INVALID-ORDER-15
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, L_L s + \frac{1}{C_L s}\right)$$

$$H(s) = -\frac{\left(C_L L_L s^2 + 1\right) \left(C_5 R_5 s - R_5 g_m + 1\right)}{2C_5 C_L L_L R_5 g_m s^3 + C_5 C_L R_5 s^2 + 2C_5 R_5 g_m s + 2C_L L_L g_m s^2 + C_L R_5 g_m s + C_L s + 2g_m}$$

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

$$H(s) = \frac{L_L s \left(-C_5 R_5 s + R_5 g_m - 1\right)}{C_5 C_L L_L R_5 s^3 + 2 C_5 L_L R_5 g_m s^2 + C_5 R_5 s + C_L L_L R_5 g_m s^2 + C_L L_L s^2 + 2 L_L g_m s + R_5 g_m + 1}$$

10.17 INVALID-ORDER-17
$$Z(s) = \left(\infty, \ \infty, \ \infty, \ \infty, \ \frac{R_5}{C_5R_5s+1}, \ L_Ls + R_L + \frac{1}{C_Ls}\right)$$

$$H(s) = -\frac{\left(C_5R_5s - R_5g_m + 1\right)\left(C_LL_Ls^2 + C_LR_Ls + 1\right)}{2C_5C_LL_LR_5g_ms^3 + 2C_5C_LR_5R_Lg_ms^2 + C_5C_LR_5s^2 + 2C_5R_5g_ms + 2C_LL_Lg_ms^2 + C_LR_5g_ms + 2C_LR_Lg_ms + C_Ls + 2g_m}$$

10.18 INVALID-ORDER-18
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(-C_5 R_5 s + R_5 g_m - 1\right)}{C_5 C_L L_L R_5 R_L s^3 + 2 C_5 L_L R_5 R_L g_m s^2 + C_5 L_L R_5 s^2 + C_5 R_5 R_L s + C_L L_L R_5 R_L g_m s^2 + C_L L_L R_5 g_m s + 2 L_L R_L g_m s + L_L s + R_5 R_L g_m + R_L g_m s + 2 L_L R_5 g_m s + 2 L_L R_5$$

10.19 INVALID-ORDER-19
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = -\frac{\left(C_{5}R_{5}s - R_{5}g_{m} + 1\right)\left(C_{L}L_{L}R_{s}^{2} + L_{L}s + R_{L}\right)}{2C_{5}C_{L}L_{L}R_{5}g_{m}s^{3} + C_{5}C_{L}L_{L}R_{5}g_{m}s^{2} + 2C_{5}L_{L}R_{5}g_{m}s^{2} + 2C_{5}R_{5}R_{L}g_{m}s + C_{5}R_{5}s + C_{L}L_{L}R_{5}g_{m}s^{2} + 2C_{L}L_{L}R_{2}g_{m}s^{2} + C_{L}L_{L}s^{2} + 2L_{L}g_{m}s + R_{5}g_{m} + 2R_{L}g_{m} + 1}{2C_{5}C_{L}L_{L}R_{5}g_{m}s^{2} + C_{L}L_{L}R_{5}g_{m}s^{2} + C_{L}L_{L}s^{2} + 2L_{L}g_{m}s + R_{5}g_{m} + 2R_{L}g_{m} + 1}{2C_{5}C_{L}L_{L}R_{5}g_{m}s^{2} + C_{L}L_{L}s^{2} + 2L_{L}g_{m}s + R_{5}g_{m} + 2R_{L}g_{m} + 1}{2C_{5}C_{L}L_{L}R_{5}g_{m}s^{2} + C_{L}L_{L}R_{5}g_{m}s^{2} + C_{L}L_{L}s^{2} + 2L_{L}g_{m}s + R_{5}g_{m} + 2R_{L}g_{m} + 1}{2C_{5}C_{L}L_{L}R_{5}g_{m}s^{2} + 2C_{L}L_{L}R_{5}g_{m}s^{2} + 2C_{L}L_{L}R_{5}g_{$$

10.20 INVALID-ORDER-20
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5}{C_5 R_5 s + 1}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = -\frac{R_L \left(C_L L_L s^2 + 1\right) \left(C_5 R_5 s - R_5 g_m + 1\right)}{2C_5 C_L L_L R_5 R_L g_m s^3 + C_5 C_L L_L R_5 R_L s^2 + 2C_5 R_5 R_L g_m s + C_5 R_5 s + C_L L_L R_5 g_m s^2 + 2C_L L_L R_L g_m s^2 + C_L L_L s^2 + C_L R_5 R_L g_m s + C_L R_L s + R_5 g_m + 2R_L g_m s^2 + 2C_L R_5 R_L g_m s^2 + C_L R_5 R_L g_$$

10.21 INVALID-ORDER-21
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, R_L\right)$$

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

10.22 INVALID-ORDER-22
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \frac{1}{C_L s}\right)$$

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

10.23 INVALID-ORDER-23
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, R_L + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L R_L s + 1\right) \left(C_5 R_5 g_m s - C_5 s + g_m\right)}{s \left(C_5 C_L R_5 g_m s + 2 C_5 C_L R_L g_m s + C_5 C_L s + 2 C_5 g_m + C_L g_m\right)}$$

10.24 INVALID-ORDER-24
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, L_L s + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L L_L s^2 + 1\right) \left(C_5 R_5 g_m s - C_5 s + g_m\right)}{s \left(2C_5 C_L L_L g_m s^2 + C_5 C_L R_5 g_m s + C_5 C_L s + 2C_5 g_m + C_L g_m\right)}$$

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

$$H(s) = \frac{L_L s \left(C_5 R_5 g_m s - C_5 s + g_m\right)}{C_5 C_L L_L R_5 g_m s^3 + C_5 C_L L_L s^3 + 2 C_5 L_L g_m s^2 + C_5 R_5 g_m s + C_5 s + C_L L_L g_m s^2 + g_m}$$

10.26 INVALID-ORDER-26 $Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, L_L s + R_L + \frac{1}{C_L s}\right)$

$$H(s) = \frac{\left(C_L L_L s^2 + C_L R_L s + 1\right) \left(C_5 R_5 g_m s - C_5 s + g_m\right)}{s \left(2C_5 C_L L_L g_m s^2 + C_5 C_L R_5 g_m s + 2C_5 C_L R_L g_m s + C_5 C_L s + 2C_5 g_m + C_L g_m\right)}$$

10.27 INVALID-ORDER-27
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(C_5 R_5 g_m s - C_5 s + g_m\right)}{C_5 C_L L_L R_5 R_L g_m s^3 + C_5 C_L L_L R_L s^3 + C_5 L_L R_5 g_m s^2 + 2 C_5 L_L R_L g_m s^2 + C_5 L_L s^2 + C_5 R_5 R_L g_m s + C_5 R_L s + C_L L_L R_L g_m s^2 + L_L g_m s + R_L g_m s^2 + C_5 R_L s +$$

10.28 INVALID-ORDER-28
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = \frac{\left(C_{5}R_{5}g_{m}s - C_{5}s + g_{m}\right)\left(C_{L}L_{L}R_{L}s^{2} + L_{L}s + R_{L}\right)}{C_{5}C_{L}L_{L}R_{5}g_{m}s^{3} + 2C_{5}C_{L}L_{L}R_{2}g_{m}s^{3} + C_{5}C_{L}L_{L}s^{3} + 2C_{5}L_{L}g_{m}s^{2} + C_{5}R_{5}g_{m}s + 2C_{5}R_{L}g_{m}s + C_{5}s + C_{L}L_{L}g_{m}s^{2} + g_{m}}$$

10.29 INVALID-ORDER-29
$$Z(s) = \left(\infty, \infty, \infty, \infty, R_5 + \frac{1}{C_5 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = \frac{R_L \left(C_L L_L s^2 + 1 \right) \left(C_5 R_5 g_m s - C_5 s + g_m \right)}{C_5 C_L L_L R_5 g_m s^3 + 2 C_5 C_L L_L R_2 g_m s^3 + C_5 C_L L_L s^3 + C_5 C_L R_5 R_L g_m s^2 + C_5 C_L R_L s^2 + C_5 R_5 g_m s + 2 C_5 R_L g_m s + C_5 s + C_L L_L g_m s^2 + C_L R_L g_m s + g_m r^2 + C_L R_L g_m s^2 + C_L R_L$$

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

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

10.31 INVALID-ORDER-31 $Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \frac{R_L}{C_L R_L s + 1}\right)$

$$H(s) = \frac{R_L \left(C_5 L_5 g_m s^2 - C_5 s + g_m \right)}{C_5 C_L L_5 R_L g_m s^3 + C_5 C_L R_L s^2 + C_5 L_5 g_m s^2 + 2 C_5 R_L g_m s + C_5 s + C_L R_L g_m s + g_m}$$

10.32 INVALID-ORDER-32
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, R_L + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L R_L s + 1\right) \left(C_5 L_5 g_m s^2 - C_5 s + g_m\right)}{s \left(C_5 C_L L_5 g_m s^2 + 2 C_5 C_L R_L g_m s + C_5 C_L s + 2 C_5 g_m + C_L g_m\right)}$$

10.33 INVALID-ORDER-33
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, L_L s + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L L_L s^2 + 1\right) \left(C_5 L_5 g_m s^2 - C_5 s + g_m\right)}{s \left(C_5 C_L L_5 g_m s^2 + 2C_5 C_L L_L g_m s^2 + C_5 C_L s + 2C_5 g_m + C_L g_m\right)}$$

10.34 INVALID-ORDER-34
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \frac{L_L s}{C_L L_L s^2 + 1}\right)$$

$$H(s) = \frac{L_L s \left(C_5 L_5 g_m s^2 - C_5 s + g_m\right)}{C_5 C_L L_5 L_L g_m s^4 + C_5 C_L L_L s^3 + C_5 L_5 g_m s^2 + 2 C_5 L_L g_m s^2 + C_5 s + C_L L_L g_m s^2 + g_m}$$

10.35 INVALID-ORDER-35
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, L_L s + R_L + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L L_L s^2 + C_L R_L s + 1\right) \left(C_5 L_5 g_m s^2 - C_5 s + g_m\right)}{s \left(C_5 C_L L_5 g_m s^2 + 2 C_5 C_L L_L g_m s^2 + 2 C_5 C_L R_L g_m s + C_5 C_L s + 2 C_5 g_m + C_L g_m\right)}$$

10.36 INVALID-ORDER-36
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(C_5 L_5 g_m s^2 - C_5 s + g_m\right)}{C_5 C_L L_5 L_L R_L g_m s^4 + C_5 C_L L_L R_L s^3 + C_5 L_5 L_L g_m s^3 + C_5 L_5 R_L g_m s^2 + 2 C_5 L_L R_L g_m s^2 + C_5 L_L s^2 + C_5 R_L s + C_L L_L R_L g_m s^2 + L_L g_m s + R_L g_m s^2 + C_5 R_L s + C_5 R_L$$

10.37 INVALID-ORDER-37
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = \frac{\left(C_5 L_5 g_m s^2 - C_5 s + g_m\right) \left(C_L L_L R_L s^2 + L_L s + R_L\right)}{C_5 C_L L_5 L_L g_m s^4 + 2 C_5 C_L L_L R_L g_m s^3 + C_5 C_L L_L s^3 + C_5 L_5 g_m s^2 + 2 C_5 L_L g_m s^2 + 2 C_5 R_L g_m s + C_5 s + C_L L_L g_m s^2 + g_m}$$

10.38 INVALID-ORDER-38
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + \frac{1}{C_5 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = \frac{R_L \left(C_L L_L s^2 + 1 \right) \left(C_5 L_5 g_m s^2 - C_5 s + g_m \right)}{C_5 C_L L_5 L_L g_m s^4 + C_5 C_L L_5 R_L g_m s^3 + 2 C_5 C_L L_L R_L g_m s^3 + C_5 C_L L_L s^3 + C_5 C_L R_L s^2 + C_5 L_5 g_m s^2 + 2 C_5 R_L g_m s + C_5 s + C_L L_L g_m s^2 + C_L R_L g_m s + g_m R_L \left(C_L L_L s^2 + 1 \right) \left(C_5 L_5 g_m s^2 - C_5 s + g_m \right)}$$

10.39 INVALID-ORDER-39
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_{5s}}{C_5 L_{5s}^2 + 1}, \frac{1}{C_L s}\right)$$

$$H(s) = \frac{-C_5 L_5 s^2 + L_5 g_m s - 1}{C_5 C_L L_5 s^3 + 2C_5 L_5 g_m s^2 + C_L L_5 g_m s^2 + C_L s + 2g_m}$$

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

$$H(s) = \frac{R_L \left(-C_5 L_5 s^2 + L_5 g_m s - 1 \right)}{C_5 C_L L_5 R_L s^3 + 2 C_5 L_5 R_L g_m s^2 + C_5 L_5 s^2 + C_L L_5 R_L g_m s^2 + C_L R_L s + L_5 g_m s + 2 R_L g_m + 1}$$

10.41 INVALID-ORDER-41
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_{5s}}{C_5 L_{5s}^2 + 1}, R_L + \frac{1}{C_L s}\right)$$

$$H(s) = -\frac{\left(C_L R_L s + 1\right) \left(C_5 L_5 s^2 - L_5 g_m s + 1\right)}{2C_5 C_L L_5 R_L g_m s^3 + C_5 C_L L_5 s^3 + 2C_5 L_5 g_m s^2 + C_L L_5 g_m s^2 + 2C_L R_L g_m s + C_L s + 2g_m s^2}$$

10.42 INVALID-ORDER-42
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, L_L s + \frac{1}{C_L s}\right)$$

$$H(s) = -\frac{\left(C_L L_L s^2 + 1\right) \left(C_5 L_5 s^2 - L_5 g_m s + 1\right)}{2C_5 C_L L_5 L_L g_m s^4 + C_5 C_L L_5 s^3 + 2C_5 L_5 g_m s^2 + C_L L_5 g_m s^2 + 2C_L L_L g_m s^2 + C_L s + 2g_m s^2 + 2C_L L_L g_m s^2 + C_L s + 2g_m s^2 + 2C_L L_L g_m s^2 + C_L s + 2g_m s^2 + 2C_L L_L g_m s^2 + C_L s + 2g_m s^2 + 2C_L L_L g_m s^2 + C_L s + 2g_m s^2 + 2C_L L_L g_m s^2 + C_L s + 2g_m s^2 + 2C_L L_L g_m s^2 +$$

10.43 INVALID-ORDER-43
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \frac{L_L s}{C_L L_L s^2 + 1}\right)$$

$$H(s) = \frac{L_L s \left(-C_5 L_5 s^2 + L_5 g_m s - 1\right)}{C_5 C_L L_5 L_L s^4 + 2 C_5 L_5 L_L g_m s^3 + C_5 L_5 s^2 + C_L L_5 L_L g_m s^3 + C_L L_L s^2 + L_5 g_m s + 2 L_L g_m s + 1}$$

10.44 INVALID-ORDER-44
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_{5}s}{C_{5}L_{5}s^{2}+1}, L_{L}s + R_{L} + \frac{1}{C_{L}s}\right)$$

$$H(s) = -\frac{\left(C_5L_5s^2 - L_5g_ms + 1\right)\left(C_LL_Ls^2 + C_LR_Ls + 1\right)}{2C_5C_LL_5L_Lg_ms^4 + 2C_5C_LL_5R_Lg_ms^3 + C_5C_LL_5s^3 + 2C_5L_5g_ms^2 + C_LL_5g_ms^2 + 2C_LL_Lg_ms^2 + 2C_LR_Lg_ms + C_Ls + 2g_ms^2}$$

10.45 INVALID-ORDER-45
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(-C_5 L_5 s^2 + L_5 g_m s - 1\right)}{C_5 C_L L_5 L_L R_L s^4 + 2 C_5 L_5 L_L R_L g_m s^3 + C_5 L_5 L_L s^3 + C_5 L_5 R_L s^2 + C_L L_5 L_L R_L g_m s^3 + C_L L_L R_L s^2 + L_5 L_L g_m s^2 + L_5 R_L g_m s + 2 L_L R_L g_m s + L_L s + R_L g_m s^2 + L_5 R_L g_m s^2 + L$$

10.46 INVALID-ORDER-46
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = -\frac{\left(C_5L_5s^2 - L_5g_ms + 1\right)\left(C_LL_LR_Ls^2 + L_Ls + R_L\right)}{2C_5C_LL_5L_Lg_ms^4 + C_5C_LL_5L_Ls^4 + 2C_5L_5L_Lg_ms^3 + 2C_5L_5R_Lg_ms^2 + C_LL_5L_Lg_ms^3 + 2C_LL_LR_Lg_ms^3 + 2C_LR_Lg_ms^3 + 2C_LR$$

10.47 INVALID-ORDER-47
$$Z(s) = \left(\infty, \ \infty, \ \infty, \ \frac{L_5 s}{C_5 L_5 s^2 + 1}, \ \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = -\frac{R_L \left(C_L L_L s^2 + 1 \right) \left(C_5 L_5 s^2 - L_5 g_m s + 1 \right)}{2 C_5 C_L L_5 L_L g_m s^4 + C_5 C_L L_5 L_L s^4 + C_5 C_L L_5 R_L g_m s^2 + 2 C_5 L_5 R_L g_m s^2 + C_5 L_5 S^2 + C_L L_5 L_L g_m s^3 + C_L L_5 R_L g_m s^2 + 2 C_L L_L R_L g_m s^2 + C_L L_L S^2 + C_L R_L S + L_5 g_m s + 2 R_L S + C_L R_L S + C_L$$

10.48 INVALID-ORDER-48
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \frac{1}{C_L s}\right)$$

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

10.49 INVALID-ORDER-49
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \frac{R_L}{C_L R_L s + 1}\right)$$

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

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

10.51 INVALID-ORDER-51
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, L_L s + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L L_L s^2 + 1\right) \left(C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m\right)}{s \left(C_5 C_L L_5 g_m s^2 + 2 C_5 C_L L_L g_m s^2 + C_5 C_L R_5 g_m s + C_5 C_L s + 2 C_5 g_m + C_L g_m\right)}$$

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

$$H(s) = \frac{L_L s \left(C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m\right)}{C_5 C_L L_5 L_L q_m s^4 + C_5 C_L L_L R_5 q_m s^3 + C_5 C_L L_L s^3 + C_5 L_5 q_m s^2 + 2 C_5 L_L q_m s^2 + C_5 R_5 q_m s + C_5 s + C_L L_L q_m s^2 + q_m}$$

10.53 INVALID-ORDER-53
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, L_L s + R_L + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L L_L s^2 + C_L R_L s + 1\right) \left(C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m\right)}{s \left(C_5 C_L L_5 g_m s^2 + 2 C_5 C_L L_L g_m s^2 + C_5 C_L R_5 g_m s + 2 C_5 C_L R_L g_m s + C_5 C_L s + 2 C_5 g_m + C_L g_m\right)}$$

10.54 INVALID-ORDER-54
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m\right)}{C_5 C_L L_5 L_L R_L g_m s^4 + C_5 C_L L_L R_5 R_L g_m s^3 + C_5 L_L L_R g_m s^3 + C_5 L_5 L_L g_m s^3 + C_5 L_5 L_L g_m s^3 + C_5 L_5 L_L g_m s^2 + C_5 L_L R_5 g_m s^2 + 2 C_5 L_L R_L g_m s^2 + C_5 L_L s^2 + C_5 R_5 R_L g_m s + C_5 R_L s + C_L L_L R_5 R_L g_m s^2 + C_5 R_5 R_L g_$$

10.55 INVALID-ORDER-55
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = \frac{\left(C_{L}L_{L}R_{L}s^{2} + L_{L}s + R_{L}\right)\left(C_{5}L_{5}g_{m}s^{2} + C_{5}R_{5}g_{m}s - C_{5}s + g_{m}\right)}{C_{5}C_{L}L_{5}L_{L}g_{m}s^{4} + C_{5}C_{L}L_{L}R_{5}g_{m}s^{3} + 2C_{5}C_{L}L_{L}R_{2}g_{m}s^{3} + C_{5}C_{L}L_{L}s^{3} + C_{5}L_{5}g_{m}s^{2} + 2C_{5}L_{L}g_{m}s^{2} + C_{5}R_{5}g_{m}s + 2C_{5}R_{L}g_{m}s + C_{5}s + C_{L}L_{L}g_{m}s^{2} + g_{m}s^{2}}$$

10.56 INVALID-ORDER-56
$$Z(s) = \left(\infty, \infty, \infty, \infty, L_5 s + R_5 + \frac{1}{C_5 s}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = \frac{R_L \left(C_L L_L s^2 + 1 \right) \left(C_5 L_5 g_m s^2 + C_5 R_5 g_m s - C_5 s + g_m \right)}{C_5 C_L L_5 L_L g_m s^4 + C_5 C_L L_L R_5 g_m s^3 + 2 C_5 C_L L_L R_L g_m s^3 + C_5 C_L L_L s^3 + C_5 C_L R_5 g_m s^2 + C_5 C_L R_L s^2 + C_5 L_5 g_m s^2 + C_5 R_5 g_m s + 2 C_5 R_L g_m s + C_5 s + C_5 R_5 g_m s^2 + C_5 R_5 g_m$$

10.57 INVALID-ORDER-57
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{1}{C_L s}\right)$$

$$H(s) = \frac{-C_5 L_5 R_5 s^2 + L_5 R_5 g_m s - L_5 s - R_5}{C_5 C_L L_5 R_5 s^3 + 2 C_5 L_5 R_5 g_m s^2 + C_L L_5 R_5 g_m s^2 + C_L L_5 s^2 + C_L R_5 s + 2 L_5 g_m s + 2 R_5 g_m}$$

10.58 INVALID-ORDER-58
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{R_L}{C_L R_L s + 1}\right)$$

$$H(s) = \frac{R_L \left(-C_5 L_5 R_5 s^2 + L_5 R_5 g_m s - L_5 s - R_5 \right)}{C_5 C_L L_5 R_5 R_L g^3 + 2 C_5 L_5 R_5 R_L g_m s^2 + C_5 L_5 R_5 g_m s^2 + C_L L_5 R_L g_m s^2 + C_L L_5 R_L g_m s^2 + C_L L_5 R_L g_m s + L_5 R_5 g_m s + 2 L_5 R_L g_m s + L_5 s + 2 R_5 R_L g_m + R_5 R_5 g_m s + 2 L_5 R_5 g_m s +$$

10.59 INVALID-ORDER-59
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, R_L + \frac{1}{C_L s}\right)$$

$$H(s) = -\frac{\left(C_L R_L s + 1\right) \left(C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5\right)}{2 C_5 C_L L_5 R_5 g_m s^3 + C_5 C_L L_5 R_5 s^3 + 2 C_5 L_5 R_5 g_m s^2 + C_L L_5 R_5 g_m s^2 + 2 C_L L_5 R_L g_m s^2 + C_L L_5 s^2 + 2 C_L R_5 R_L g_m s + C_L R_5 s + 2 L_5 g_m s + 2 R_5 g_m s^2 + C_L R_5 R_L g_m s^2 + C_L R_5 R_L g_m s + C_L R$$

10.60 INVALID-ORDER-60
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, L_L s + \frac{1}{C_L s}\right)$$

$$H(s) = -\frac{\left(C_{L}L_{L}s^{2} + 1\right)\left(C_{5}L_{5}R_{5}s^{2} - L_{5}R_{5}g_{m}s + L_{5}s + R_{5}\right)}{2C_{5}C_{L}L_{5}L_{L}R_{5}g_{m}s^{4} + C_{5}C_{L}L_{5}R_{5}s^{3} + 2C_{5}L_{5}R_{5}g_{m}s^{2} + 2C_{L}L_{5}L_{L}g_{m}s^{3} + C_{L}L_{5}R_{5}g_{m}s^{2} + C_{L}L_{5}s^{2} + 2C_{L}L_{L}R_{5}g_{m}s^{2} + C_{L}R_{5}s + 2L_{5}g_{m}s + 2R_{5}g_{m}s^{2} + C_{L}L_{5}s^{2} + 2C_{L}L_{5}R_{5}g_{m}s^{2} + C_{L}R_{5}s^{2} + 2C_{L}R_{5}s^{2} + 2C_{$$

10.61 INVALID-ORDER-61
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{L_L s}{C_L L_L s^2 + 1}\right)$$

$$H(s) = \frac{L_L s \left(-C_5 L_5 R_5 s^2 + L_5 R_5 g_m s - L_5 s - R_5\right)}{C_5 C_L L_5 L_L R_5 s^4 + 2 C_5 L_5 L_L R_5 g_m s^3 + C_5 L_5 R_5 s^2 + C_L L_5 L_L R_5 g_m s^3 + C_L L_5 L_L R_5 s^3 + C_L L_L R_5 s^2 + 2 L_5 L_L g_m s^2 + L_5 R_5 g_m s + L_5 s + 2 L_L R_5 g_m s + R_5 R_5 g_m s^3 + C_4 L_5 R_5 g_m s^3 + C_5 R_5 g$$

10.62 INVALID-ORDER-62
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, L_L s + R_L + \frac{1}{C_L s}\right)$$

$$H(s) = -\frac{\left(C_{L}L_{S}^{2} + C_{L}R_{L}s + 1\right)\left(C_{5}L_{5}R_{5}s^{2} - L_{5}R_{5}g_{m}s + L_{5}s + R_{5}\right)}{2C_{5}C_{L}L_{5}L_{L}R_{5}g_{m}s^{4} + 2C_{5}C_{L}L_{5}R_{5}g_{m}s^{3} + C_{5}L_{L}S_{5}R_{5}g_{m}s^{2} + 2C_{L}L_{5}L_{L}g_{m}s^{3} + C_{L}L_{5}R_{5}g_{m}s^{2} + 2C_{L}L_{5}R_{L}g_{m}s^{2} + 2C_{L}L_{5}R_{5}g_{m}s^{2} + 2C_{$$

10.63 INVALID-ORDER-63
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(-C_5 L_5 R_5 s^2 + L_5 R_5 g_m s - L_5 s - R_5\right)}{C_5 C_L L_5 L_L R_5 R_L s^4 + 2 C_5 L_5 L_L R_5 R_L g_m s^3 + C_5 L_5 L_L R_5 R_L s^2 + C_L L_5 L_L R_5 R_L g_m s^3 + C_L L_5 L_L R_5 R_L s^3 + C_L L_L R_5 R_L s^2 + L_5 L_L R_5 g_m s^2 + 2 L_5 L_L R_5 g_m s^2 + L$$

10.64 INVALID-ORDER-64
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = -\frac{\left(C_{L}L_{L}S^{2} + L_{L}S + R_{L}\right)\left(C_{5}L_{5}R_{5}S^{2} - L_{5}R_{5}g_{m}S + L_{5}S + R_{5}\right)}{2C_{5}C_{L}L_{5}L_{L}R_{5}g_{m}S^{4} + C_{5}C_{L}L_{5}L_{L}R_{5}g_{m}S^{3} + 2C_{5}L_{5}R_{5}R_{L}g_{m}S^{2} + C_{5}L_{5}R_{5}S^{2} + C_{L}L_{5}L_{L}R_{5}g_{m}S^{3} + 2C_{L}L_{5}L_{L}R_{5}g_{m}S^{3} + 2$$

10.65 INVALID-ORDER-65
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{1}{C_5 s + \frac{1}{R_5} + \frac{1}{L_5 s}}, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = -\frac{R_L \left(C_L L_L s^2 + 1\right) \left(C_5 L_5 R_5 s^2 - L_5 R_5 g_m s + L_5 s + R_5\right)}{2C_5 C_L L_5 L_L R_5 R_d s^4 + C_5 C_L L_5 R_5 R_L s^3 + 2C_5 L_5 R_5 R_L g_m s^2 + C_5 L_5 R_5 g_m s^3 + 2C_L L_5 L_L R_5 g_m s^3 + C_L L_5 L_L s^3 + C_L L_5 R_5 R_L g_m s^2}$$

10.66 INVALID-ORDER-66
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_{5s}}{C_5L_5s^2+1} + R_5, \frac{1}{C_Ls}\right)$$

$$H(s) = \frac{C_5L_5R_5g_ms^2 - C_5L_5s^2 + L_5g_ms + R_5g_m - 1}{C_5C_LL_5R_5g_ms^3 + C_5C_LL_5s^3 + 2C_5L_5g_ms^2 + C_LL_5g_ms^2 + C_LR_5g_ms + C_Ls + 2g_m}$$

10.67 INVALID-ORDER-67
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5s}{C_5L_5s^2+1} + R_5, \frac{R_L}{C_LR_Ls+1}\right)$$

$$H(s) = \frac{R_L \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1 \right)}{C_5 C_L L_5 R_5 R_L g_m s^3 + C_5 C_L L_5 R_L s^3 + C_5 L_5 R_5 g_m s^2 + 2 C_5 L_5 R_L g_m s^2 + C_5 L_5 R_2 g_m s^2 + C_L L_5 R_L g_m s^2 + C_L R_5 R_L g_m s + C_L R_L s + L_5 g_m s + R_5 g_m + 2 R_L g_m + 1 R_5 g_m s^2 + C_5 R_5 g_m$$

10.68 INVALID-ORDER-68
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, R_L + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L R_L s + 1\right) \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1\right)}{C_5 C_L L_5 R_5 g_m s^3 + 2 C_5 C_L L_5 R_L g_m s^3 + C_5 C_L L_5 s^3 + 2 C_5 L_5 g_m s^2 + C_L L_5 g_m s^2 + C_L R_5 g_m s + 2 C_L R_L g_m s + C_L s + 2 g_m s^2}$$

10.69 INVALID-ORDER-69
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, L_L s + \frac{1}{C_L s}\right)$$

$$H(s) = \frac{\left(C_L L_L s^2 + 1\right) \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1\right)}{2C_5 C_L L_5 L_L g_m s^4 + C_5 C_L L_5 R_5 g_m s^3 + C_5 C_L L_5 s^3 + 2C_5 L_5 g_m s^2 + C_L L_5 g_m s^2 + 2C_L L_L g_m s^2 + C_L R_5 g_m s + C_L s + 2g_m r^2}$$

10.70 INVALID-ORDER-70
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \frac{L_L s}{C_L L_L s^2 + 1}\right)$$

$$H(s) = \frac{L_L s \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1\right)}{C_5 C_L L_5 L_L R_5 g_m s^4 + C_5 C_L L_5 L_L s^4 + 2 C_5 L_5 L_L g_m s^3 + C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_L L_5 L_L g_m s^3 + C_L L_L R_5 g_m s^2 + C_L L_L s^2 + L_5 g_m s + 2 L_L g_m s + R_5 g_m + 1}$$

10.71 INVALID-ORDER-71
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_{5s}}{C_5 L_{5s}^2 + 1} + R_5, L_{Ls} + R_L + \frac{1}{C_{Ls}}\right)$$

$$H(s) = \frac{\left(C_{L}L_{L}s^{2} + C_{L}R_{L}s + 1\right)\left(C_{5}L_{5}R_{5}g_{m}s^{2} - C_{5}L_{5}s^{2} + L_{5}g_{m}s + R_{5}g_{m} - 1\right)}{2C_{5}C_{L}L_{5}L_{L}g_{m}s^{4} + C_{5}C_{L}L_{5}R_{5}g_{m}s^{3} + 2C_{5}C_{L}L_{5}R_{L}g_{m}s^{3} + C_{5}C_{L}L_{5}s^{3} + 2C_{5}L_{5}g_{m}s^{2} + C_{L}L_{5}g_{m}s^{2} + C_{L}L_{5}g_{m}s^{2} + C_{L}R_{5}g_{m}s + 2C_{L}R_{L}g_{m}s + C_{L}s + 2g_{m}s^{2} + C_{L}R_{5}g_{m}s^{2} + C_{L}R$$

10.72 INVALID-ORDER-72
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1\right)}{C_5 C_L L_5 L_L R_5 g_m s^4 + C_5 C_L L_5 L_L R_5 g_m s^3 + 2 C_5 L_5 L_L R_L g_m s^3 + C_5 L_5 L_L s^3 + C_5 L_5 R_L g_m s^2 + C_5 L_5 R_L g_m s^2 + C_L L_5 L_L R_L g_m s^3 + C_L L_L R_5 R_L g_m s^2 + C_L R_5 R_L g_m s^2$$

10.73 INVALID-ORDER-73
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \frac{L_L s}{C_L L_L s^2 + 1} + R_L\right)$$

$$H(s) = \frac{\left(C_{L}L_{L}R_{L}s^{2} + L_{L}s + R_{L}\right)\left(C_{5}L_{5}R_{5}g_{m}s^{2} - C_{5}L_{5}s^{2} + L_{5}g_{m}s + R_{5}g_{m} - 1\right)}{C_{5}C_{L}L_{5}L_{L}R_{5}g_{m}s^{4} + 2C_{5}L_{L}L_{L}L_{2}s^{4} + 2C_{5}L_{5}L_{L}g_{m}s^{3} + C_{5}L_{5}R_{5}g_{m}s^{2} + 2C_{5}L_{5}R_{L}g_{m}s^{2} + C_{5}L_{5}s^{2} + C_{L}L_{5}L_{L}g_{m}s^{3} + C_{L}L_{L}R_{5}g_{m}s^{2} + 2C_{L}L_{L}R_{L}g_{m}s^{3} + C_{L}L_{L}R_{5}g_{m}s^{2} + C_{5}L_{5}R_{5}g_{m}s^{2} + C_{5}L$$

10.74 INVALID-ORDER-74
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{L_5 s}{C_5 L_5 s^2 + 1} + R_5, \frac{R_L \left(L_L s + \frac{1}{C_L s}\right)}{L_L s + R_L + \frac{1}{C_L s}}\right)$$

$$H(s) = \frac{R_L \left(C_L L_L s^2 + 1 \right) \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 + L_5 g_m s + R_5 g_m - 1 \right)}{C_5 C_L L_5 L_L R_5 g_m s^4 + 2 C_5 C_L L_5 L_L R_L g_m s^4 + C_5 C_L L_5 R_L g_m s^3 + C_5 C_L L_5 R_L g_m s^3 + C_5 C_L L_5 R_L g_m s^3 + C_5 L_5 R_L g_m s^2 + 2 C_5 L_5 R_L g_m s^2 + C_5 L_5 R_L g_m s^3 + C_L L_5 R_L g_m s^$$

10.75 INVALID-ORDER-75
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5\left(L_5s + \frac{1}{C_5s}\right)}{L_5s + R_5 + \frac{1}{C_5s}}, \frac{1}{C_Ls}\right)$$

$$H(s) = \frac{C_5L_5R_5g_ms^2 - C_5L_5s^2 - C_5R_5s + R_5g_m - 1}{C_5C_LL_5R_5g_ms^3 + C_5C_LL_5s^3 + C_5C_LR_5s^2 + 2C_5L_5g_ms^2 + 2C_5R_5g_ms + C_LR_5g_ms + C_LS + 2g_m}$$

10.76 INVALID-ORDER-76
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5\left(L_5 s + \frac{1}{C_5 s}\right)}{L_5 s + R_5 + \frac{1}{C_5 s}}, \frac{R_L}{C_L R_L s + 1}\right)$$

$$H(s) = \frac{R_L \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 - C_5 R_5 s + R_5 g_m - 1 \right)}{C_5 C_L L_5 R_5 g_m s^3 + C_5 C_L L_5 R_L s^3 + C_5 C_L R_5 R_L s^2 + C_5 L_5 R_5 g_m s^2 + 2 C_5 L_5 R_L g_m s^2 + C_5 L_5 s^2 + 2 C_5 R_5 R_L g_m s + C_5 R_5 s + C_L R_5 R_L g_m s + C_L R_L s + R_5 g_m + 2 R_L g_m + 1}$$

10.77 INVALID-ORDER-77
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5\left(L_5 s + \frac{1}{C_5 s}\right)}{L_5 s + R_5 + \frac{1}{C_5 s}}, R_L + \frac{1}{C_L s}\right)$$

$$H(s) = -\frac{\left(C_L R_L s + 1\right) \left(-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1\right)}{C_5 C_L L_5 R_5 q_m s^3 + 2 C_5 C_L L_5 R_L q_m s^3 + C_5 C_L L_5 s^3 + 2 C_5 C_L R_5 R_L q_m s^2 + C_5 C_L R_5 s^2 + 2 C_5 L_5 q_m s^2 + 2 C_5 R_5 q_m s + C_L R_5 q_m s + 2 C_L R_L q_m s + C_L s + 2 q_m r^2 + 2 C_5 R_5 q_m s^2 + 2 C_5 R_5 q_m s^2 + 2 C_5 R_5 q_m s^2 + 2 C_5 R_5 q_m s + 2 C_L R_5 q_m s + C_L R_5 q_m$$

10.78 INVALID-ORDER-78
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5\left(L_5 s + \frac{1}{C_5 s}\right)}{L_5 s + R_5 + \frac{1}{C_5 s}}, L_L s + \frac{1}{C_L s}\right)$$

10.79 INVALID-ORDER-79
$$Z(s) = \left(\infty, \ \infty, \ \infty, \ \infty, \ \frac{R_5\left(L_5s + \frac{1}{C_5s}\right)}{L_5s + R_5 + \frac{1}{C_5s}}, \ \frac{L_Ls}{C_LL_Ls^2 + 1}\right)$$

$$H(s) = \frac{L_L s \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 - C_5 R_5 s + R_5 g_m - 1\right)}{C_5 C_L L_5 L_L R_5 g_m s^4 + C_5 C_L L_L R_5 s^3 + 2 C_5 L_5 L_2 g_m s^3 + C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + 2 C_5 L_L R_5 g_m s^2 + C_5 R_5 s + C_L L_L R_5 g_m s^2 + C_L L_L s^2 + 2 L_L g_m s + R_5 g_m + C_5 L_5 R_5 g_m s^2 + C_5 R_$$

$$\begin{aligned} \textbf{10.80} \quad & \textbf{INVALID-ORDER-80} \ Z(s) = \left(\infty, \ \infty, \ \infty, \ \frac{R_5 \left(L_5 s + \frac{1}{C_5 s} \right)}{L_5 s + R_5 + \frac{1}{C_5 s}}, \ L_L s + R_L + \frac{1}{C_L s} \right) \\ & \qquad \qquad \left(C_L L_L s^2 + C_L R_L s + 1 \right) \left(-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1 \right) \\ & \qquad \qquad \left(C_L L_L s^2 + C_L R_L s + 1 \right) \left(-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 s - R_5 g_m + 1 \right) \\ & \qquad \qquad \left(C_L L_L s^2 + C_L R_L s + 1 \right) \left(-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s^2 + C_5 R_5 g_m s^2 + C_5 R$$

10.81 INVALID-ORDER-81
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5\left(L_5 s + \frac{1}{C_5 s}\right)}{L_5 s + R_5 + \frac{1}{C_5 s}}, \frac{1}{C_L s + \frac{1}{R_L} + \frac{1}{L_L s}}\right)$$

$$H(s) = \frac{L_L R_L s \left(C_5 L_5 R_5 g_m s^2 - C_5 L_5 s^2 - C_5 R_5 s + R_5 g_m - 1\right)}{C_5 C_L L_5 L_L R_5 R_L g_m s^4 + C_5 C_L L_5 L_L R_5 R_L s^3 + C_5 L_5 L_L R_5 g_m s^3 + 2 C_5 L_5 L_L R_5 g_m s^3 + C_5 L_5 L_L g_m s^3 + C_5 L_5 R_L g_m s^2 + C_5 R_5 R_L g_m$$

10.82 INVALID-ORDER-82
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5\left(L_5s + \frac{1}{C_5s}\right)}{L_5s + R_5 + \frac{1}{C_5s}}, \frac{L_Ls}{C_LL_Ls^2 + 1} + R_L\right)$$

$$H(s) = -\frac{\left(C_{L}L_{L}R_{L}s^{2} + L_{L}s + R_{L}\right)\left(-C_{5}L_{5}R_{5}g_{m}s^{2} + C_{5}L_{5}s^{2} + C_{5}R_{5}s - L_{5}R_{5}g_{m}s^{2} + C_{5}L_{5}L_{5}R_{5}g_{m}s^{2} + C_{5}L_{5}L_{5}R_{5}g_{m}s^{2} + C_{5}L_{5}L_{5}R_{5}g_{m}s^{2} + C_{5}L_{5}R_{5}g_{m}s^{2} + C_{5}L_{5}R_{5}g$$

10.83 INVALID-ORDER-83
$$Z(s) = \left(\infty, \infty, \infty, \infty, \frac{R_5\left(L_5s + \frac{1}{C_5s}\right)}{L_5s + R_5 + \frac{1}{C_5s}}, \frac{R_L\left(L_Ls + \frac{1}{C_Ls}\right)}{L_Ls + R_L + \frac{1}{C_Ls}}\right)$$

$$H(s) = -\frac{R_L \left(C_L L_L s^2 + 1 \right) \left(-C_5 L_5 R_5 g_m s^2 + C_5 L_5 s_s g_m s^2 + C_5 L_5 R_5 g_m s^2 + C_5 L_5 R_5 g_m s^2 + C_5 L_5 R_5 g_m s^3 + C_5 C_L R_5 g_m s^3 + C_5 C_L$$