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6. FET phase-shift : $g_m = 6000\ \mu S$ $R = 12\ k\Omega$

$r_d = 36\ k\Omega$ $f = 2,5\ kHz$

$C = \ldots ?$

$$f = \frac{1}{2\pi RC\sqrt{6}}$$

$$C = \frac{1}{2\pi R f \sqrt{6}} = \frac{1}{2 \cdot 3,14 \cdot 12\times10^{3} \cdot 2,5\times10^{3} \cdot \sqrt{6}} = 2,16\times10^{-9}\ F = 2,16\ nF$$

7. BJT phase-shift : $R = 6\ k\Omega$

$C = 1500\ pF = 1,5\ nF$

$R_c = 18\ k\Omega$

$$f = \frac{1}{2\pi RC}\frac{1}{\sqrt{6+4(R_c/R)}}$$

$$f = \frac{1}{2 \cdot 3,14 \cdot 6\times10^{3} \cdot 1,5\times10^{-9} \cdot \sqrt{6+4(18k/6k)}} = 4168,13\ Hz$$

8. $R = 10\ k\Omega$ Wien Bridge

$C = 2400\ pF = 2,4\ nF$

$$f = \frac{1}{2\pi RC} = \frac{1}{2 \cdot 3,14 \cdot 10\times10^{3} \cdot 2,4\times10^{-9}} = 6634,82\ Hz$$

9. FET Colpitts : $C_1 = 750\ pF$ $L = 40\ \mu H$

$C_2 = 2500\ pF$

$$C_{eq} = \frac{C_1 C_2}{C_1 + C_2} = \frac{750\ pF \cdot 2500\ pF}{750\ pF + 2500\ pF} = \frac{7500}{17}\ pF = 576,92\ pF$$

$$f_0 = \frac{1}{2\pi\sqrt{L C_{eq}}} = \frac{1}{2 \cdot 3,14\sqrt{40\times10^{-6} \cdot 576,92\times10^{-12}}} = 1,05\ MHz$$

10. $L = 100\ \mu H$ $C_1 = 0{,}005\ \mu F$ $C_c = 10\ \mu F$

$L_{RFC} = 0{,}5\ mH$ $C_2 = 0{,}01\ \mu F$

$$C_{eq} = \frac{C_1 C_2}{C_1 + C_2} = \frac{0{,}005 \cdot 0{,}01}{0{,}005 + 0{,}01} = \frac{1}{300}\ \mu F$$

$$f_0 = \frac{1}{2\pi\sqrt{L C_{eq}}} = \frac{1}{2 \cdot 3{,}14\sqrt{100 \times 10^{-6} \cdot \frac{1}{300} \times 10^{-6}}} = 275{,}66\ kHz$$

11. $C = 250\ pF$ $L_2 = 1{,}5\ mH$

$L_1 = 1{,}5\ mH$ $M = 0{,}5\ mH$

$$L_{eq} = L_1 + L_2 + 2M = 1{,}5\ mH + 1{,}5\ mH + 2 \cdot 0{,}5\ mH = 4\ mH$$

$$f_0 = \frac{1}{2\pi\sqrt{L_{eq} \cdot C}} = \frac{1}{2 \cdot 3{,}14\sqrt{4 \times 10^{-3} \cdot 250 \times 10^{-12}}} = 159{,}15\ kHz$$

12. $L_{RFC} = 0{,}5\ mH$ $L_2 = 750\ \mu H$ $C = 150\ pF$

$L_1 = 750\ \mu H$ $M = 150\ \mu H$

$$L_{eq} = L_1 + L_2 + 2M = 750\ \mu H + 750\ \mu H + 2 \cdot 150\ \mu H = 1800\ \mu H = 1{,}8\ mH$$

$$f_0 = \frac{1}{2\pi\sqrt{L_{eq} \cdot C}} = \frac{1}{2 \cdot 3{,}14\sqrt{1{,}8 \times 10^{-3} \cdot 150 \times 10^{-12}}} = 306{,}3\ kHz$$