4.25) $\Gamma_{m_2} = 0.476\angle 166^\circ \Rightarrow Y_{m_2} = 51 - j15\ mS$

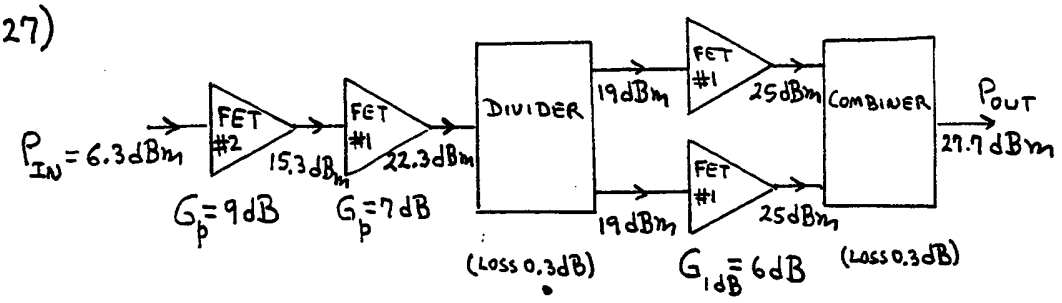
$\Gamma_{ML} = 0.846\angle 72^\circ \Rightarrow Y_{ML} = 3 - j14\ mS$

$(BW)^{'}_{IN} = \frac{2(4\,10^9)\,0.051}{0.015} = 27.2\ GHz$, $(BW)^{'}_{OUT} = \frac{2(4\,10^9)\,0.003}{0.014} = 1.714\ GHz$

THE VALUE OF L'_{OUT} REQUIRED FOR $BW \approx (BW)_{OUT} = 400\ MHz$ IS

$$L'_{OUT} = \frac{1}{\omega_0 |B_{OUT,m}| \left[\frac{(BW)^{'}_{OUT}}{(BW)_{OUT}} - 1\right]} = \frac{1}{2\pi(4\,10^9)\,0.014\left[\frac{1.714\,10^9}{0.4\,10^9} - 1\right]} = 0.865\ nH$$

4.27)



4.29) $P_{IN} = \frac{E^2_{s,rms}}{4(50)} = \frac{(79.5\,10^{-3})^2}{200} = 3.16\,10^{-5}\ W$ OR $-15\ dBm$

$P_{OUT} = P_{IN} + 13 + 13 + 10 + 9 = -15 + 45 = 30\ dBm$

OR $P_{OUT} = 1\ W$

4.31) YES.

4.28) $K = 1.61$, $\Delta = 0.313\angle 18.8°$ ∴ UNCONDITIONALLY STABLE

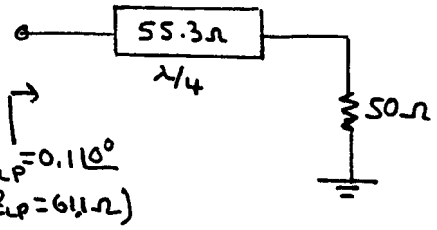
$\Gamma_L = \Gamma_{LP} = 0.1\angle 0°$ AND $\Gamma_s = \Gamma_{SP} = \Gamma_{IN}^* = 0.324\angle 146.6°$

OUTPUT MATCHING CIRCUIT:

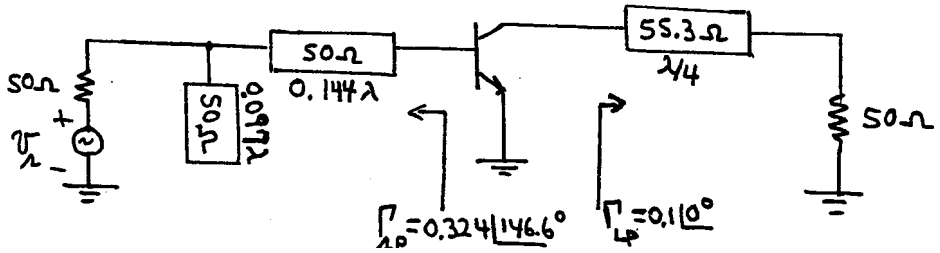
$Z_{LP} = 61.1\ \Omega$

USING A $\lambda/4$ TRANSFORMER

$Z_0 = \sqrt{61.1(50)} = 55.3\ \Omega$



INPUT MATCHING CIRCUIT: USE A SHUNT STUB (OPEN CIRCUIT) OF LENGTH 0.097λ FOLLOWED BY A SERIES TRANS. LINE OF LENGTH 0.144λ.



4.26) FROM (4.7.4): $P_{i,mds} = -174 + 10\log_{800}10^6 + 5 + 3 = -76.97$ dBm

FROM (4.7.5): $P_{o,mds} = P_{i,mds} + G_A = -76.97 + 30 = -46.97$ dBm.
(WITH $G_A = G_T$)

$$DR = P_{1dB} - P_{o,mds} = 28 - (-46.97) = 74.97\ dB$$

$$P_{IP} = P_{1dB} + 10 = 28 + 10 = 38\ dBm$$

$$DR_f = \frac{2}{3}(P_{IP} - P_{o,mds}) = \frac{2}{3}(38 - (-46.97)) = 69.3\ dB$$

FOR NO THIRD-ORDER IM:

$$P_{out} = P_{o,mds} + DR_f = -46.97 + 69.3 = 22.3\ dBm$$