Solution – Test #1.

① $\tilde{I} = -5 + j4 = 6.4 e^{j141^\circ}$

$\therefore I(t) = 6.4 \cos(\omega t + 141^\circ) = 6.4 \cos(\omega t + 0.78\pi)$

② $\Gamma = \dfrac{Z_L - Z_0}{Z_L + Z_0} = \dfrac{(60 - j100) - 100}{(60 - j100) + 100} = 0.57 e^{-j79.8^\circ}$

&

$d_{I_{min}} = d_{V_{max}} = \dfrac{\theta_r \lambda}{4\pi} + \dfrac{n\lambda}{2} = \dfrac{-79.8 \times (16\text{cm}) \times (\pi \text{ rad})}{4\pi \times 180} + \dfrac{16}{2}$

$= 6.22\text{cm}$

③ $\tan(\beta l) = \tan\left(\dfrac{2\pi}{\lambda} \times 0.875\lambda\right) = \tan(315^\circ) = -1$

$Z_{in} = Z_0 \left[\dfrac{Z_L + j Z_0 \tan\beta l}{Z_0 + j Z_L \tan\beta l}\right] = 50 \left[\dfrac{(100 - j100) + j\,50(-1)}{-j100 - j100) + 50}\right]$

$= 40 + j70 = 80.6 e^{j60}.$

The Complete Smith Chart

Black Magic Design

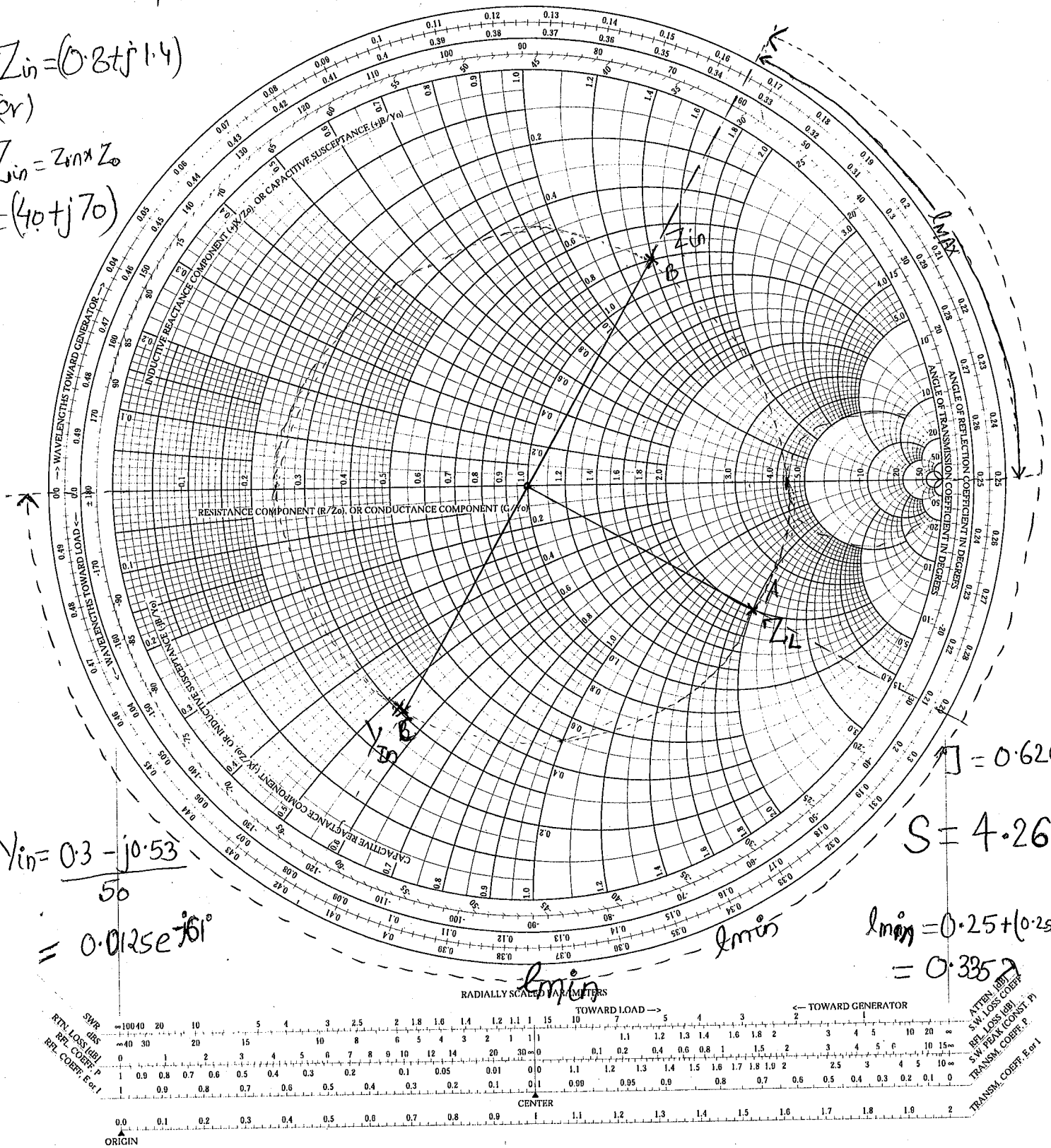
$Z_L = \frac{Z_L}{Z_0} = (2-2j)$. point A

$Z_{in} = (0.8 + j\,1.4)$

(or)

$Z_{in} = z_{in} \times Z_0$

$= (40 + j\,70)$



$\Gamma = 0.62 e^{-j30^\circ}$

$S = 4.26$

$Y_{in} = \frac{0.3 - j0.53}{50}$

$= 0.0125 e^{-j61^\circ}$

$l_{min} = 0.25 + (0.25 - 0.16)$

$= 0.335$