Lecture 11

ENEE 434 Electronics II

(1)

2 April 2008

Smith Charts and tx lines

Only if use when Z_L is the ratio of the systems Z

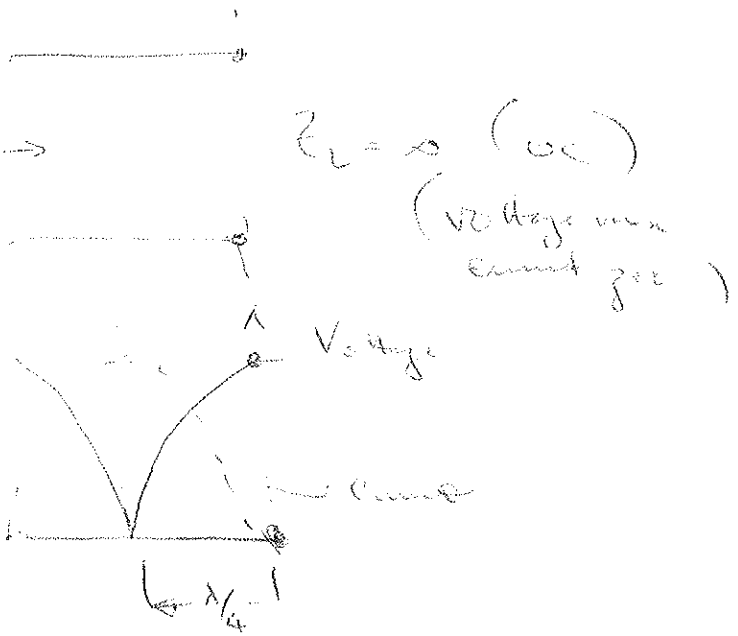
Z_L' → Z_L

Z_L': lowercase

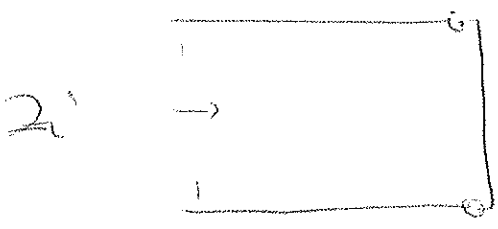
Z_L: uppercase

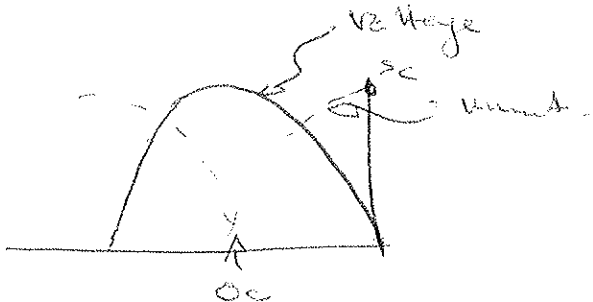
$\times \lambda$

Example 1



Example 2.



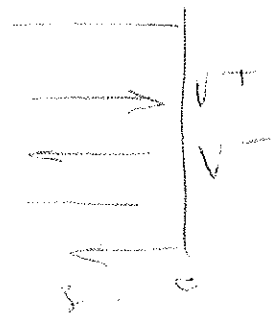


Forward Wave

$$V^+ = e^{-j\frac{2\pi}{\lambda}z} e^{j\omega t}$$

Backward Wave

$$V^- = e^{+j\frac{2\pi}{\lambda}z} e^{j\omega t}$$



At any pt

$$(V^+ + V^-) = \left(e^{-j\frac{2\pi}{\lambda}z} + e^{+j\frac{2\pi}{\lambda}z}\right) e^{j\omega t}$$

$$= 2\cos\left(\frac{2\pi}{\lambda}\right)z \cdot e^{j\omega t}$$

$= 1$ when $z = 0$ (or)

$= 0$ when $z = \lambda/4$ (or)

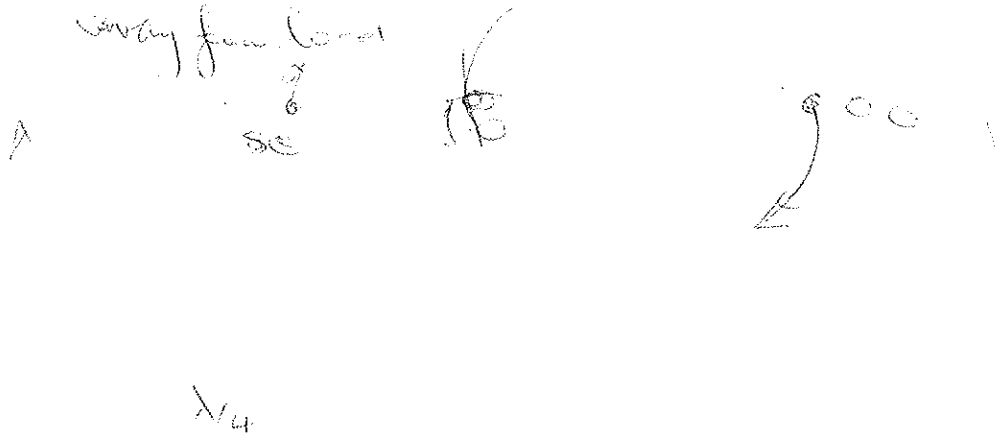
$= 1$ when $z = 2\lambda/4$ (or)

$= 0$ when $z = \frac{3\lambda}{4}$ (or)

Sixth sheet

(5)

2



$\lambda/4$

Graph $\quad \zeta = 0.3151$

$Z_L = 20\Omega + j100\Omega$

What is ζ_L

Scaled impedance $\quad \zeta_L = \left(\frac{Z_L}{Z_0}\right) = \left(\frac{20}{50}\right) + j\left(\frac{100}{50}\right)$

(Z_L: LC; Z_0: uc; both ratios: unitless)

$= 0.4 + j2$

Plot ζ_L

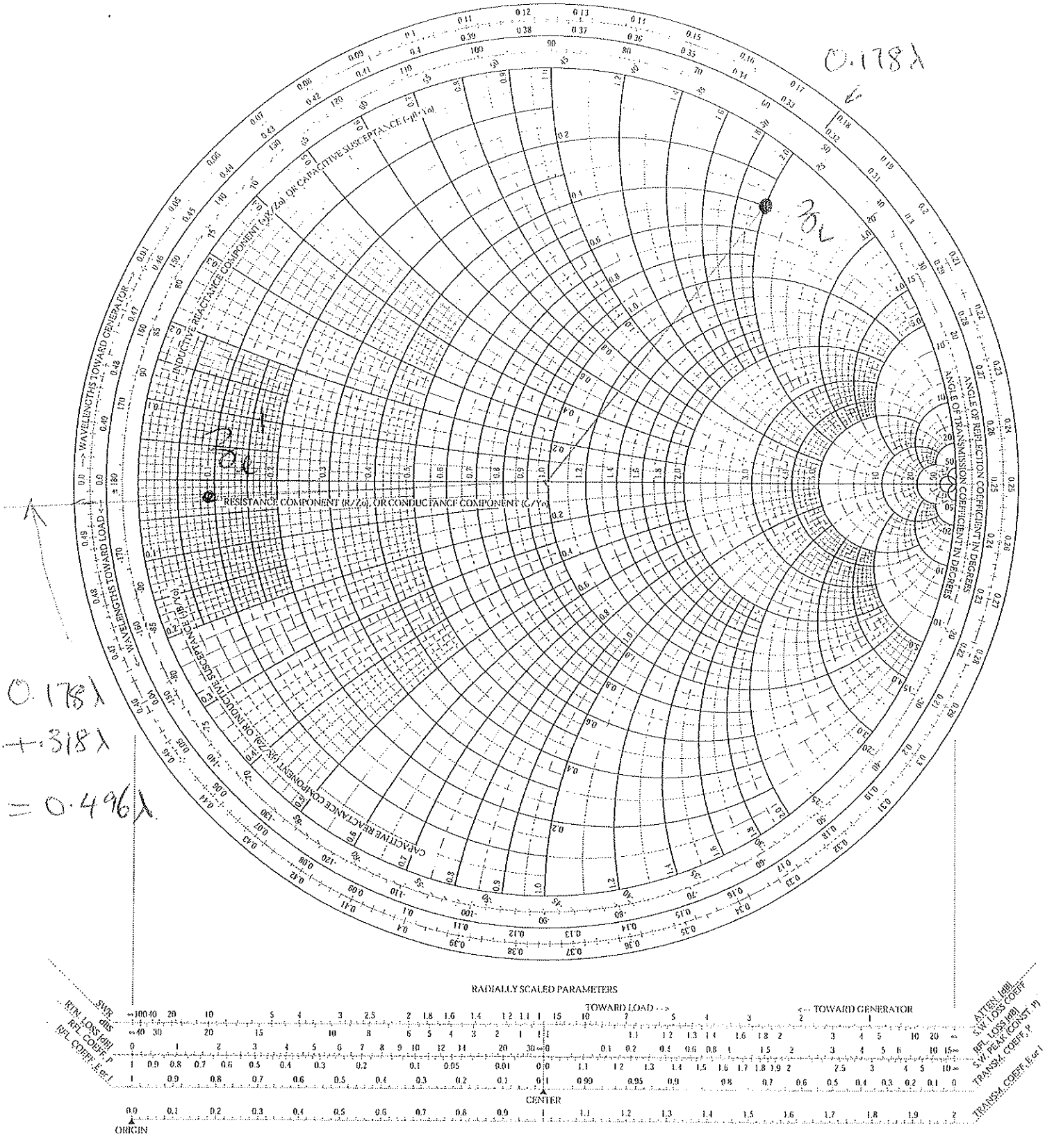
Move 0.3151λ away from load

New $\quad \zeta_L' = 0.08 - j0.02$

$\therefore Z_L' = 4\Omega - j1\Omega$

Student Name.....Student ID.....ENEL434

Smith Chart



To be handed in with your answer booklet