Lec-24

Friday, May 29, 2020 8:35 AM

Finals : Tue 06/09/2020
12:00 – 2:00pm

Ans 1 (a) $\lambda = 0.1$ @ $f = 3GHz$

$\beta = \frac{2\pi}{\lambda} = 62.8$

$Z_{sc} = jZ_0 \tan(\beta l) = j36\,\Omega$

$Z_{oc} = -jZ_0 \cot(\beta l) = -j88.8\,\Omega.$

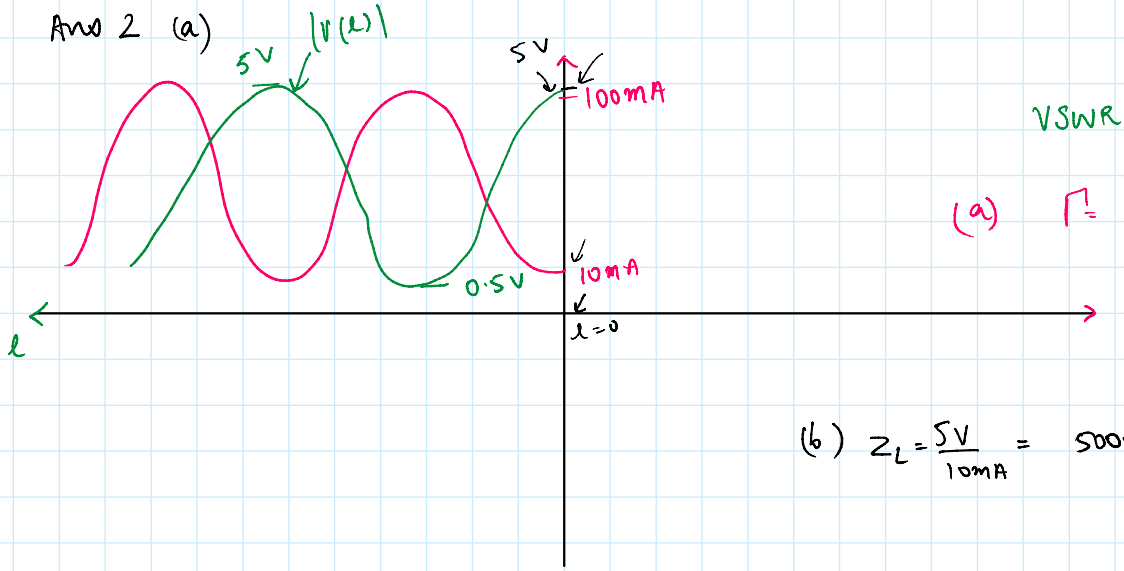
(b) $\lambda = 0.03$ @ $f = 10GHz$

$\beta = 209.4$

$Z_{sc} = -j86.6$

$Z_{oc} = j28.86.$

Ans 2 (a)

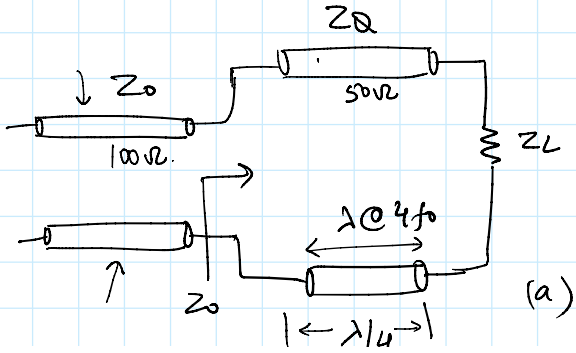


$VSWR = \frac{5}{0.5} = 10$

(a) $\Gamma = \frac{VSWR-1}{VSWR+1} = \frac{9}{11} = 0.818$

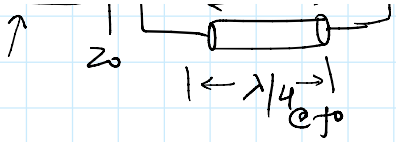
(b) $Z_L = \frac{5V}{10mA} = 500\,\Omega.$

Ans 3



@ f_0

(a) $Z_0^2 = Z_0 Z_L$

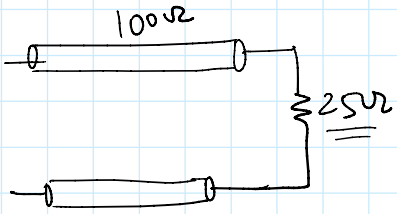


(a) $Z_0^2 = Z_0 Z_L$

$50^2 = 100 \cdot Z_L$

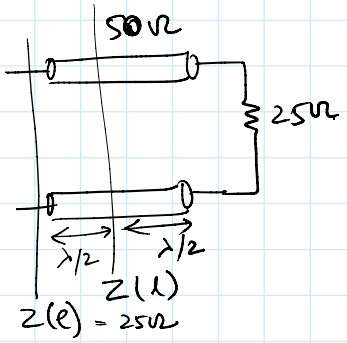
$Z_L = 25\Omega$.

(b) @ $4f_0$



$\Gamma = -0.6$

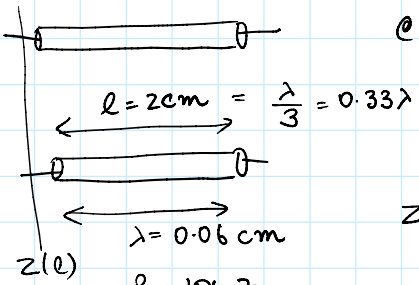
VSWR = 4



Ans 4 (a) Electrical length = $\lambda/4$

(Z_L) Load is an open circuit

(b)



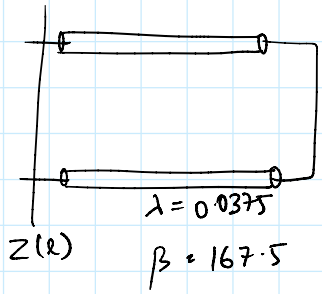
@ $f = 5GHz$.

$\beta = 104.7$

$Z(e) = j\,28.86\ \Omega$

$Z_{OC} = -jZ_0 \cot(\beta\ell)$

(c)



@ 8GHz

$\beta = 167.5$

$Z(\ell)$ $\quad \lambda = 0.05\lambda$

$\beta = 167.5$

$Z(\ell) = j10.6\ \Omega$

Real Part:

$$r = \frac{(1+u)(1-u) - v^2}{(1-u)^2 + v^2}$$

↓ Rearrange.

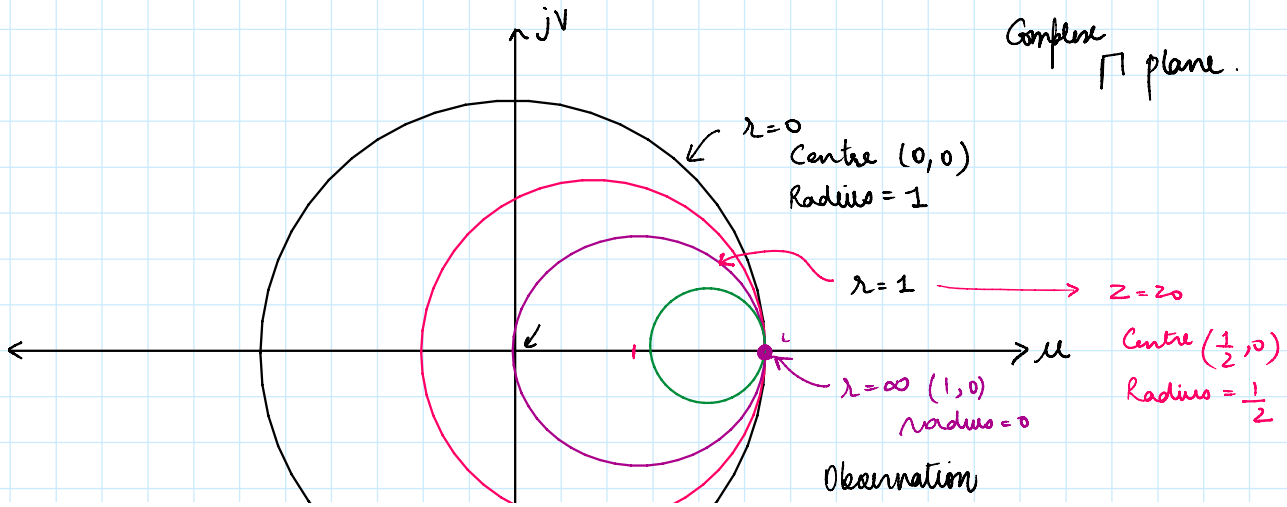
$$u^2 - 2\left(\frac{r}{1+r}\right)u + v^2 + \frac{r-1}{r+1} = 0$$

} Constant resistance circle.

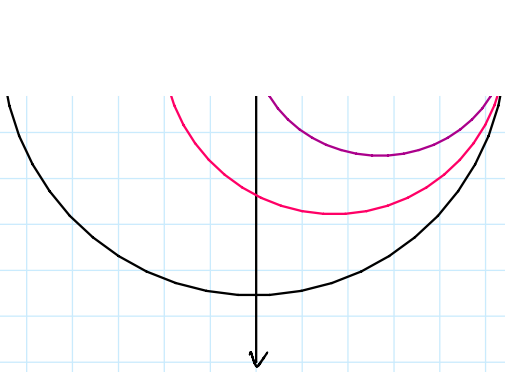
Equation of circle — Centre: $\left(\frac{r}{r+1}, 0\right)$

Radius $= \frac{1}{r+1}$

Locus of all reactance points for a given value of r.



Complex Γ plane.



radius = 0

Observation

1. As r ↑ , centre shifts to right
, radius reduces