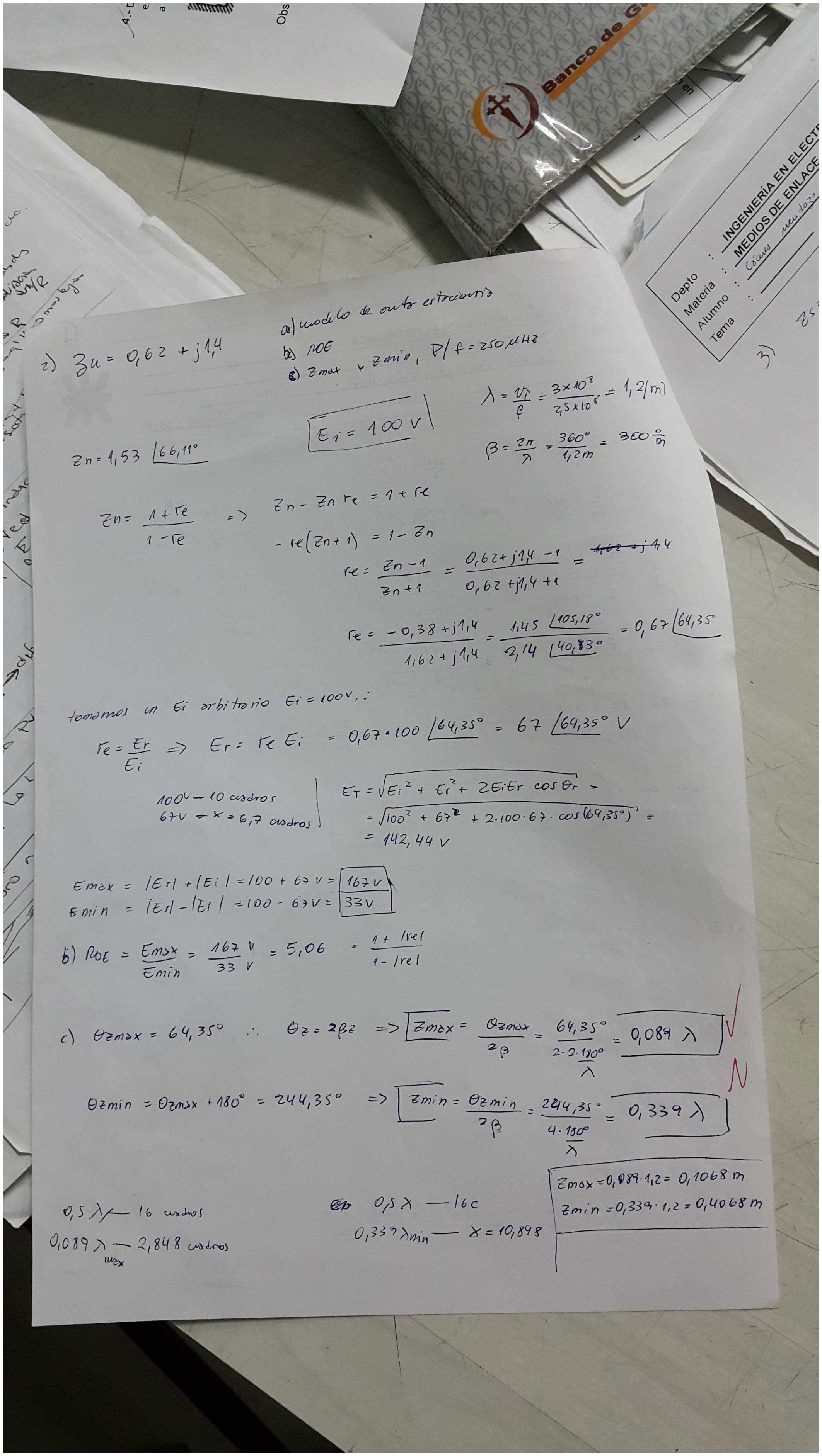

2) $Z_u = 0{,}62 + j1{,}4$

a) modelo de onda estacionaria
b) ROE
c) Z_{max} y Z_{min}, P/ f = 250 MHz

$\lambda = \frac{v_r}{f} = \frac{3\times10^8}{2{,}5\times10^8} = 1{,}2\,[m]$

$\beta = \frac{2\pi}{\lambda} = \frac{360°}{1{,}2\,m} = 300\,\frac{°}{m}$

$E_i = 100\,V$

$Z_n = 1{,}53\ \angle 66{,}11°$

$Z_n = \frac{1+\Gamma_e}{1-\Gamma_e} \Rightarrow Z_n - Z_n\Gamma_e = 1 + \Gamma_e$

$-\Gamma_e(Z_n + 1) = 1 - Z_n$

$\Gamma_e = \frac{Z_n - 1}{Z_n + 1} = \frac{0{,}62 + j1{,}4 - 1}{0{,}62 + j1{,}4 + 1} =$ ~~1,62 + j1,4~~

$\Gamma_e = \frac{-0{,}38 + j1{,}4}{1{,}62 + j1{,}4} = \frac{1{,}45\ \angle 105{,}18°}{2{,}14\ \angle 40{,}83°} = 0{,}67\ \angle 64{,}35°$

tomamos un Ei arbitrario Ei = 100V, ∴

$\Gamma_e = \frac{E_r}{E_i} \Rightarrow E_r = \Gamma_e E_i = 0{,}67 \cdot 100\ \angle 64{,}35° = 67\ \angle 64{,}35°\ V$

100V — 10 cuadros
67V — x = 6,7 cuadros

$E_T = \sqrt{E_i^2 + E_r^2 + 2E_iE_r\cos\theta_r} =$
$= \sqrt{100^2 + 67^2 + 2\cdot100\cdot67\cdot\cos(64{,}35°)} =$
$= 142{,}44\ V$

$E_{max} = |E_r| + |E_i| = 100 + 67\,V = 167\,V$
$E_{min} = |E_r| - |E_i| = 100 - 67\,V = 33\,V$

b) $ROE = \frac{E_{max}}{E_{min}} = \frac{167\,V}{33\,V} = 5{,}06 = \frac{1+|\Gamma_e|}{1-|\Gamma_e|}$

c) $\theta_{zmax} = 64{,}35°$ ∴ $\theta_z = 2\beta z \Rightarrow Z_{max} = \frac{\theta_{zmax}}{2\beta} = \frac{64{,}35°}{2\cdot2\cdot180°/\lambda} = 0{,}089\,\lambda$ ✓

$\theta_{zmin} = \theta_{zmax} + 180° = 244{,}35° \Rightarrow Z_{min} = \frac{\theta_{zmin}}{2\beta} = \frac{244{,}35°}{4\cdot180°/\lambda} = 0{,}339\,\lambda$ N

0,5 λ — 16 cuadros
$0{,}089\,\lambda_{max}$ — 2,848 cuadros

0,5 λ — 16c
$0{,}339\,\lambda_{min}$ — x = 10,848

$Z_{max} = 0{,}089\cdot1{,}2 = 0{,}1068\,m$
$Z_{min} = 0{,}339\cdot1{,}2 = 0{,}4068\,m$