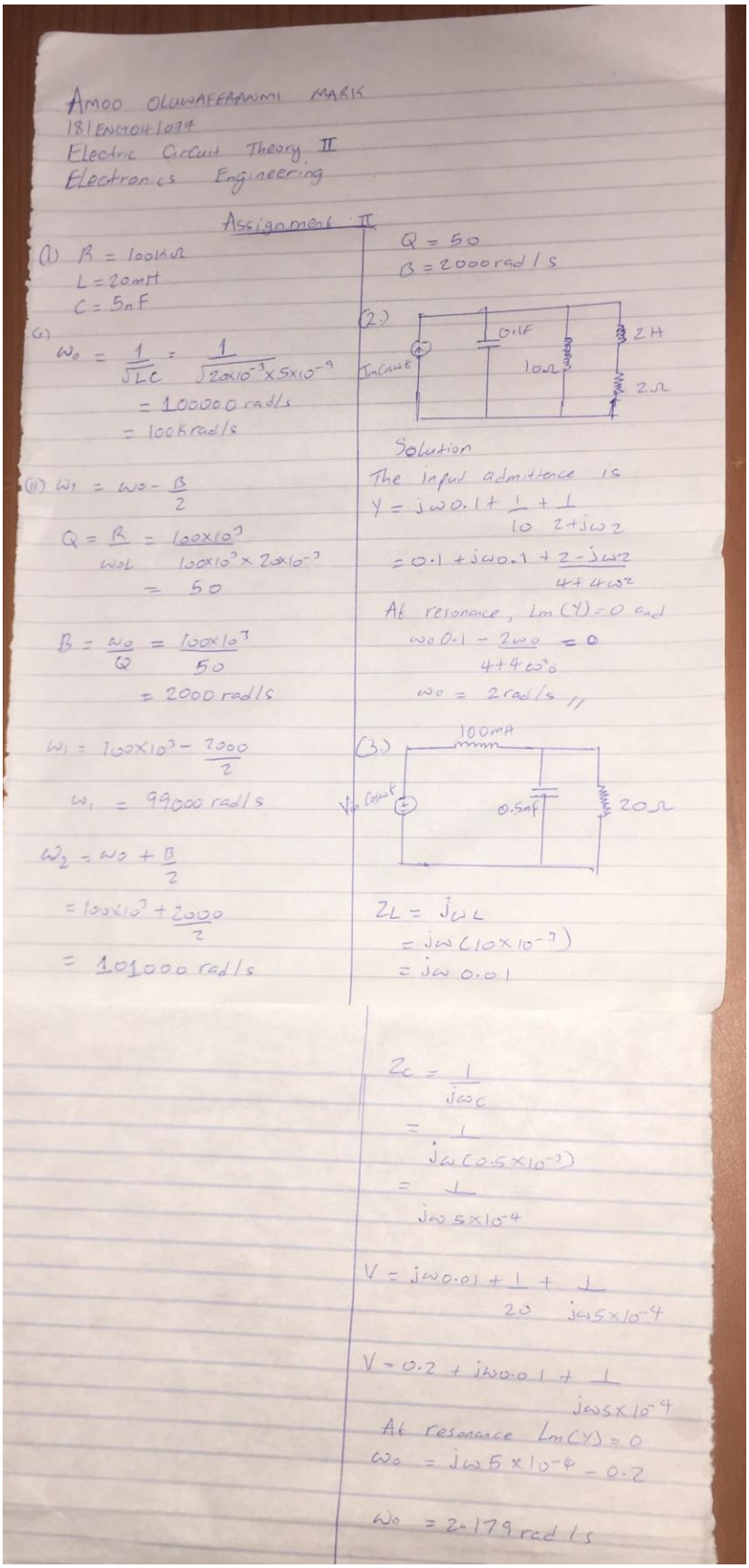
Amoo Oluwaferanmi Mark
18/eng04/077
Electric circuit Theory II
Assignment 2



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Electric Circuit Theory II
Electronics Engineering

Assignment II

(1) $R = 100k\Omega$
$L = 20mH$
$C = 5nF$

(i) $\omega_o = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{20\times10^{-3}\times5\times10^{-9}}}$
$= 100000$ rad/s
$= 100$k rad/s

(ii) $\omega_1 = \omega_o - \frac{B}{2}$

$Q = \frac{R}{\omega_o L} = \frac{100\times10^3}{100\times10^3\times20\times10^{-3}}$
$= 50$

$B = \frac{\omega_o}{Q} = \frac{100\times10^3}{50}$
$= 2000$ rad/s

$\omega_1 = 100\times10^3 - \frac{2000}{2}$

$\omega_1 = 99000$ rad/s

$\omega_2 = \omega_o + \frac{B}{2}$

$= 100\times10^3 + \frac{2000}{2}$

$= 101000$ rad/s

$Q = 50$
$B = 2000$ rad/s

(2.)

Solution
The input admittance is
$Y = j\omega 0.1 + \frac{1}{10} + \frac{1}{2+j\omega 2}$
$= 0.1 + j\omega 0.1 + \frac{2-j\omega 2}{4+4\omega^2}$

At resonance, $Im(Y) = 0$ and
$\omega_o 0.1 - \frac{2\omega_o}{4+4\omega_o^2} = 0$
$\omega_o = 2$ rad/s //

(3.)

$Z_L = j\omega L$
$= j\omega(10\times10^{-3})$
$= j\omega 0.01$

$Z_c = \frac{1}{j\omega C}$
$= \frac{1}{j\omega(0.5\times10^{-3})}$
$= \frac{1}{j\omega 5\times10^{-4}}$

$V = j\omega 0.01 + \frac{1}{20} + \frac{1}{j\omega 5\times10^{-4}}$

$V = 0.2 + j\omega 0.01 + \frac{1}{j\omega 5\times10^{-4}}$

At resonance $Im(Y) = 0$
$\omega_o = j\omega 5\times10^{-4} - 0.2$

$\omega_o = 2.179$ rad/s