AKUMA SUNNY. U.
17/ENG04/009
ELECTRIC CIRCUIT THEORY II
ELECTRONICS ENGINEERING
20th April, 2020
ASSIGNMENT II

1 $R = 100k\Omega$

$L = 20mH$

$C = 5nF$

i) $\omega_0 = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{200\times10^{-3}\times5\times10^{-9}}}$

$= 100\,000$ rad/s

$= 100k$ rad/s

ii) $\omega_1 = \omega_0 - \frac{\beta}{2}$

$Q = \frac{R}{\omega_0 L} = \frac{100\times10^3}{100\times10^3\times20\times10^{-3}}$

$= 50$

$\beta = \frac{\omega_0}{Q} = \frac{100\times10^3}{50}$

$= 2000$ rad/s

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

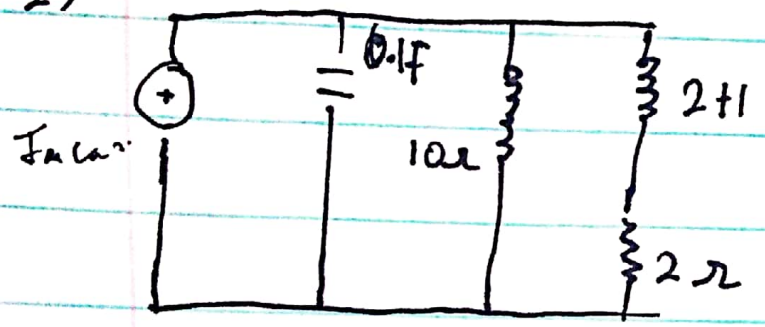
$\omega_1 = 99000$ rad/s

$$\omega_2 = \omega_0 + \frac{B}{2}$$

$$= 100 \times 10^3 + \frac{2000}{2}$$

$$= 101000 \text{ rad/s} \quad 10100 \text{ rad/s}$$

(2)



Solution

The Input impedance is

$$Y = j\omega 0.1 + \frac{1}{10} + \frac{1}{2 + j\omega 2}$$

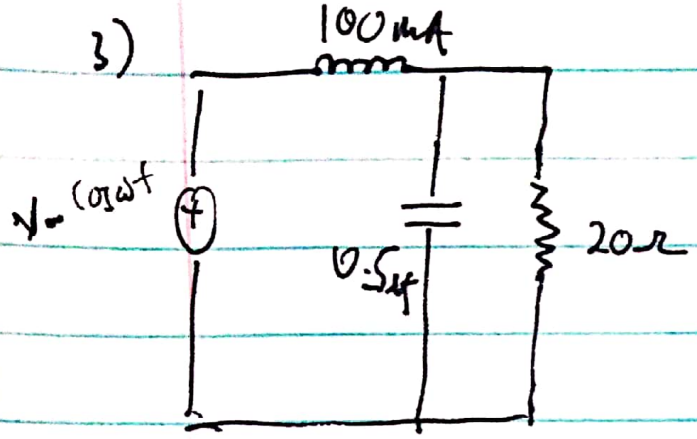
$$= 0.1 + j\omega 0.1 + \frac{2 - j\omega 2}{4 + 4\omega^2}$$

At resistance, $Im(Y) = 0$ and

$$\omega_0 0.1 - \frac{2\omega_0}{4 + 4\omega_0^2} = 0$$

$$\omega_0 = 2 \text{ rad/s}$$

3)



$Z_L = j\omega L$

$= j\omega(10 \times 10^{-3})$

$= j\omega\, 0.01$

$Z_C = \frac{1}{j\omega C}$

$= \frac{1}{j\omega(0.5 \times 10^{-3})}$

$= \frac{1}{j\omega 5 \times 10^{-4}}$

$V = j\omega 0.01 + \frac{1}{20} + \frac{1}{j\omega 5 \times 10^{-4}}$

$V = 0.2 + j\omega 0.01 + \frac{1}{j\omega 5 \times 10^{-4}}$

At resonance $\mathrm{Im}(y) = 0$

~~$\omega_0 = j\omega 5 \times 10^{-4}$~~ $\omega_0 = j\omega 5 \times 10^{-4} - 0.2$

$\omega_0 = 2.179$ rad/s