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17/ENG02/020
COMPUTER ENGINEERING

i) A parallel resonant circuit has R = 100kΩ L = 20mH & C = 5nf Calculate ω_o, ω_1, ω_2 Q & B

$$\rightarrow \omega_o = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{(20\times10^{-3})\times(5\times10^{-3})}}$$

$$= 100 \text{ krads}^{-1}$$

$$\rightarrow B = \frac{\omega_o}{Q} = \frac{1}{RC} = \frac{1}{100\times(5\times10^{-3})}$$

$$= 2 \text{ krads}^{-1}$$

from above $\omega_o = 100 \text{ krads}^{-1}$ & $B = 2 \text{ krads}^{-1}$

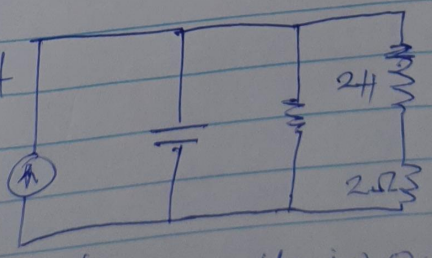
$$\therefore Q = \frac{\omega_o}{B} = \frac{100\times100^3}{2\times10^3} = 50$$

Since $Q \geq 10$

$$\rightarrow \omega_1 = \omega_o - B/2 = 100\times10^3 - 2\times10^3/2 = 99 \text{ krads}^{-1}$$

$$\omega_2 = \omega_o + B/2 = 100\times10^3 \times 2\times10^3/2 = 101 \text{ krads}$$

ii) Determine the resistant frequency of the circuit below



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

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

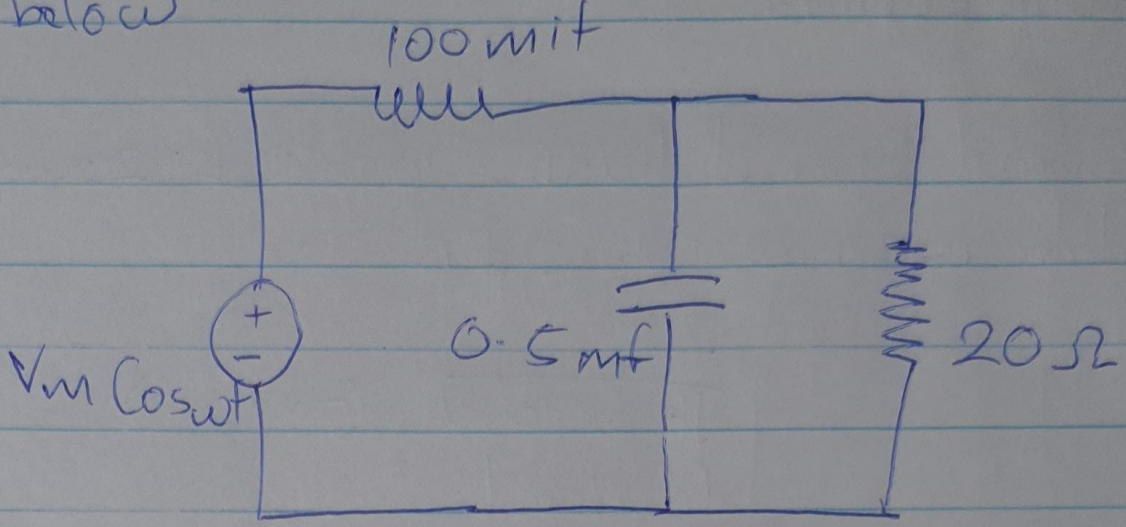
at resistance

$$Im(Y) = 0$$

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

$\omega_o = 2 rads^{-1}$

iii Calculate the resonant frequency of the c
below



At resonance of the imaginary part at $\omega =$

$\underline{80,000j\omega} + \underline{j\omega(100 \times 10^{-3})}$

$-400j\omega - 4000000$

$= 800000\omega + [-40\omega^2] - 400000$

$= 4000000 - 400\omega^2 = 0$

$-40\omega^2 = -400000$

$\omega^2 = \underline{-400000}$

-40

$= 10000$

$\omega = \sqrt{10000} = 100 rad^{*}s^{-1}$