ELEC2400   **ELECTRONIC CIRCUITS**   FALL 2021-22
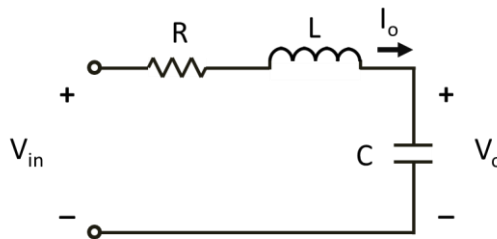
HOMEWORK 4

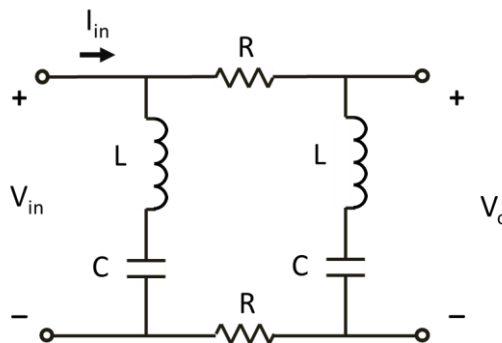Issued on Nov. 14, 2021 (Sunday)
Due date: Nov. 23, 2021 (Tuesday), 11:59pm
[Please submit your homework online https://canvas.ust.hk]

Assume ideal op amp in all cases.

Q1. Find the transfer functions $H(s) = \dfrac{V_o(s)}{V_{in}(s)}$ and $G(s) = \dfrac{I_o(s)}{V_{in}(s)}$.

Q2. Find the transfer functions $H(s) = \dfrac{V_o(s)}{V_{in}(s)}$ and $R(s) = \dfrac{V_o(s)}{I_{in}(s)}$.
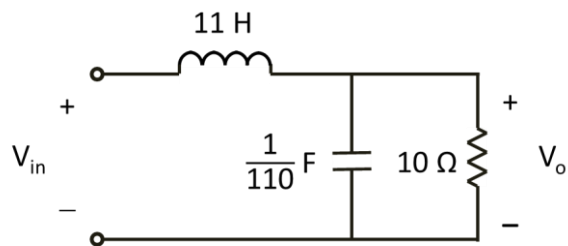

Q3. Sketch the Bode plots of

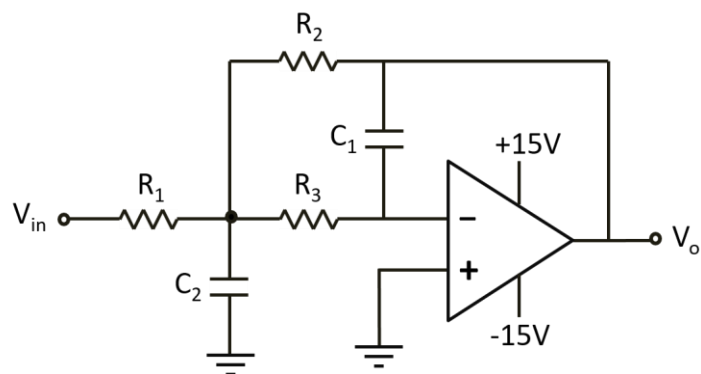$$H(s) = \frac{10^6 s}{s^2 + 10010s + 10^5}$$

Q4. Sketch the Bode plots of

$$H(s) = \frac{10^4}{\dfrac{s^2}{10} + 200s + 10^5}$$

Q5. Find the transfer function $H(s) = \dfrac{V_o(s)}{V_{in}(s)}$ and sketch the Bode plots of $H(s)$.

11 H

V_{in} $\frac{1}{110}$ F   10 Ω V_o

Q6. Find the transfer function $H(s) = \dfrac{V_o(s)}{V_{in}(s)}$. What type of filter is this? What is the order?

R_2

C_1 +15V

R_1 R_3

V_{in}

C_2

V_o

-15V

Q7. Find the transfer function $H(s) = \dfrac{V_o(s)}{V_{in}(s)}$. Sketch the Bode plots for the case $R_1 = R_2 = 1$ kΩ and C = 1 µF. What type of filter is this? What is the order?

Two blank graphs with logarithmic x-axes labeled "Angular Frequency (rad/s)" ranging from 0.1 to 10^7.

Graph 1 x-axis labels: 0.1, 1, 10, 100, 10^3, 10^4, 10^5, 10^6, 10^7

Angular Frequency (rad/s)

Graph 2 x-axis labels: 0.1, 1, 10, 100, 10^3, 10^4, 10^5, 10^6, 10^7

Angular Frequency (rad/s)