Name : _____ Section:_____ CWRU e-mail:_____

Department of Electrical Engineering and Computer Science
ENGR 210. Introduction to Circuits and Instruments (4)

Quiz No. 12 **4/15/05**

PUT ANSWERS IN THE SPACE PROVIDED AND, IF APPROPRIATE, SHOW YOUR WORK. BE SURE TO STATE ANY ASSUMPTIONS

Problem 1 Transfer functions (10 points)

(a) Determine the transfer function $T_V(j\omega) = \dfrac{v_o(j\omega)}{v_i(j\omega)}$ of the following circuit. Be sure to put the denominator of your transfer function in standard form.

$T_V(j\omega) =$ _____

(b) What is the cutoff frequency ω_c for this filter? $\omega_c =$ _____

(c) What is $T_V(j\omega) = \dfrac{v_o(j\omega)}{v_i(j\omega)}$ for $\omega = 2\omega_c$?

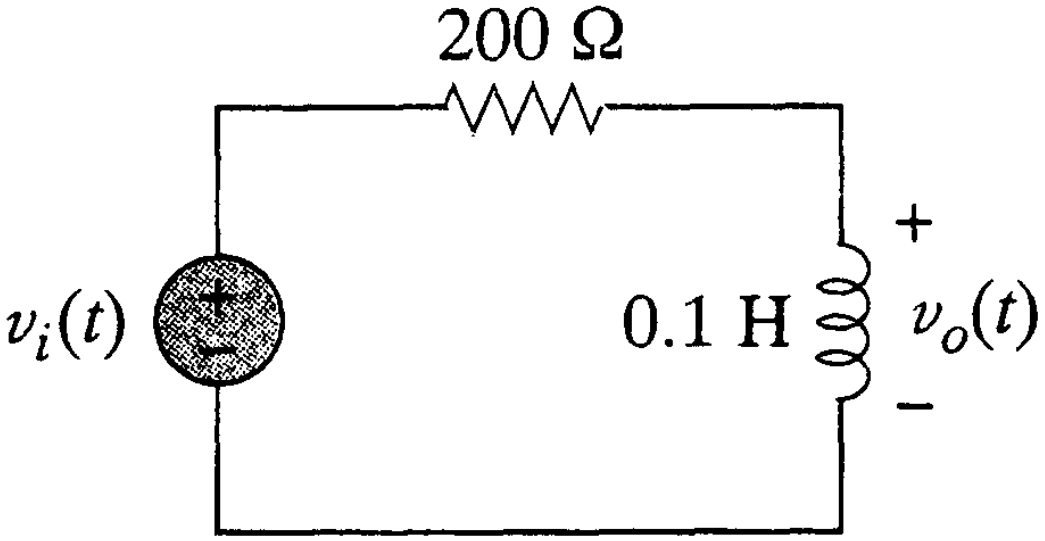
$T_V(j2\omega_c) =$ _____

(d) If $v_i(t) = 10\cos(\omega t)$ write the steady state expression for $v_o(t)$ when $\omega = 2\omega_c$.

$v_o(t) =$ _____

(e) What kind of filter is this? High-pass, low-pass, band-pass, band-reject, notch, something else?

Type = _____



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Problem 2 Frequency dependent transfer functions (10 points)

(a) What is the cutoff frequency ω_c for the filter described by

$$T_v(j\omega) = \frac{v_o(j\omega)}{v_i(j\omega)} = \frac{4}{2 + j\omega 10} \qquad \omega_c = \_\_\_\_\_$$

(b) Using the chart below plot the frequency dependence of this filter. Be sure to label your axes.

(c) What is the passband gain of this filter in decibels.

Passband gain = _____ dB