E245B

HW #9 solns., 12/04/01

Problem 11.7

Draw the bode plot for the network function.

$$H(jw) = \frac{jw2+1}{jw10+1}$$

Suggested Solution

$H(jw) = \frac{jw2+1}{jw10+1}$ Please see solution to selected answers.

Problem 11.22

Draw the Bode plot for the network function.

$$H(j\omega) = \frac{72(j\omega+2)}{j\omega\left[(j\omega)^2+2.4j\omega+144\right]}$$

Suggested Solution

$$H(j\omega) = \frac{72(j\omega+2)}{j\omega\left[(j\omega)^2+2.4j\omega+144\right]}$$

$$H(j\omega) = \frac{(0.5j\omega+1)}{j\omega\left[(j\omega/12)^2+(j\omega/60)+1\right]}$$

zeros : 1@ 2 r/s

simple pole : 1 @ dc

complex poles T = (1/12)s $ 2τξ=1/60

so Wo = 12 r/s ξ = 0.1

Problem 11.31

Find H(jw) if its amplitude characteristics is shown in fig 11.31.

Suggested Solution

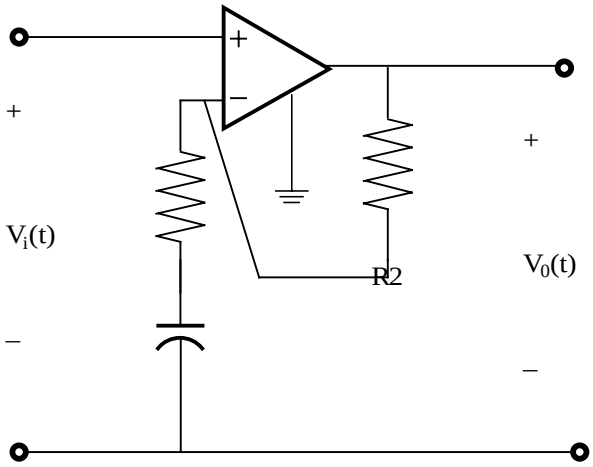
The initial slope indicates that the gain is 1,there are zeroes at w=0 and w=30. The poles are at w=1, w=100 and a double pole w=8/5

$$H(jw) = \frac{1(jw)\left(\frac{jw}{30}+1\right)}{(jw+1)\left(\frac{jw}{100}+1\right)\left(\frac{jw}{8}+1\right)^2}$$

Problem 11.61

Given the network in fig 11.61 find the transfer function and determine what type of filter the network represents.

$$\frac{V_O}{V_i}(jw)$$



Suggested Solution

$$\frac{V_O}{V_i}(jw) = 1 + \frac{Z_2}{Z_1}$$

$$Z_2 = R_2 \qquad Z_1 = R_1 + \frac{1}{jwc}$$

$$\therefore \frac{V_O}{V_i}(jw) = 1 + \frac{jwcR_2}{(jwc_1R_1 + 1)} = \frac{(jwc(R_1 + R_2) + 1)}{(jwc_1R_1 + 1)}$$

this is a high pass filter