ECE103 HW6, Nov. 5, 2018

[1].

6.2. As illustrated in **Figure P6.2**, the periodic square wave is the input signal to an ideal low-pass filter with the frequency spectrum shown. Find the output signal if the input signal has a period of

a. 40 ms
b. 20 ms
c. 30 ms
d. 15 ms
e. 10 ms
f. 7.5 ms

Sketch each of the output signals.

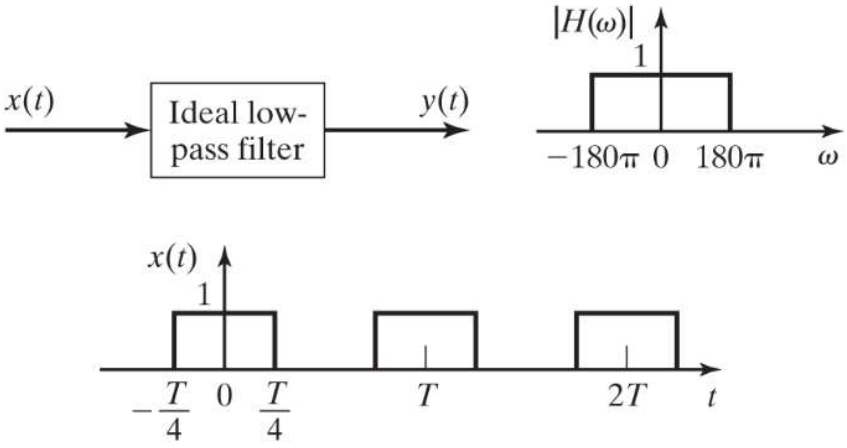

Figure P6.2

[2]

6.7. Show mathematically that the circuit shown in **Figure 6.12(a)** is a second-order Butterworth filter.

6.8. Find component values for the circuit shown in **Figure 6.12(a)** that make it a second-order Butterworth filter with a 3-dB bandwidth of

a. 10 kHz;

b. 1 kHz.

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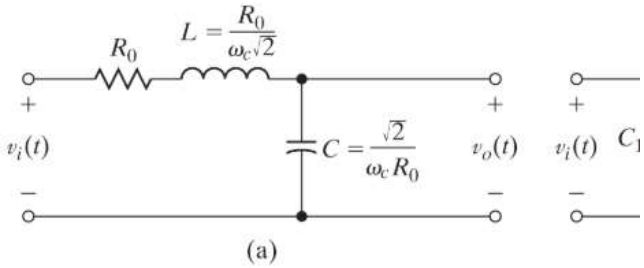

Figure 6.12 Butterworth filters.

[3].

6.8. Find component values for the circuit shown in **Figure 6.12(a)** that make it a second-order Butterworth filter with a 3-dB bandwidth of

a. 10 kHz;

b. 1 kHz.

[4].

6.14. Find the absolute bandwidth of each of the following signals:

a. $200\ \text{sinc}\,(200t)$

b. $200\ \text{sinc}\,(200t)\cos\,(600t)$

c. $\text{sinc}^2(200t)$

d. $\text{sinc}^2\,(200t)\cos(600t)$

[5].

6.24. The signal $f(t) = \cos(150\pi t)$ is sampled with an impulse train with period $T = 8$ms.

a. Find and sketch the sampled spectrum.

b. Can the signal be reconstructed by using a low-pass filter? Explain your answer.