COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Electronics and Communications

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Course : Analog Signal Processing

Course Code: EC434

Problem Set 4

P1. For the shown tolerance given in Figure 1:

a. Design a Butterworth filter.
b. Transform the tolerance into a HPF.

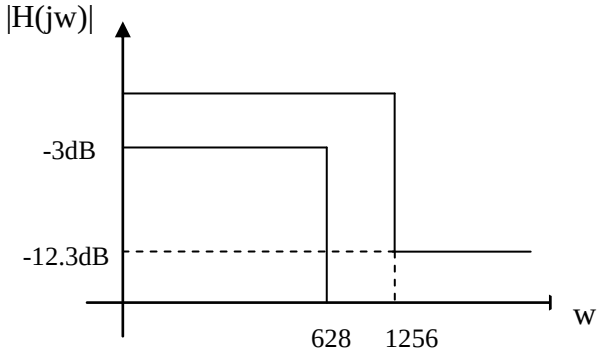

Fig.1

P2. Synthesize a maximally flat LPF using Sallen & Key configuration for w_p=2KHz and Ap=3dB if the transfer function is given as:

$$H(s) = \frac{K}{s^3 + 2s^2 + 2s + 1}$$

P3. A low pass Butterworth filter must provide a passband flatness of 3dB for f<f1=1MHz. If the order of the filter must not exceed 5:

a. What is the greatest stopband attenuation at f2=2MHz?
b. Draw the corresponding frequency response.
c. If the filter receives a signal at 5MHz, how much attenuation does the filter provides?
d. Synthesize the above filter.
e. If the filter order must not exceed 2, how much attenuation can be obtained from f1 to f2?

P4. For the filter specifications given in Problem 1, design a Chebyshev filter.

P5. For a unity gain filter with the following specifications:

f_c=100Hz @3dB
f_s=350Hz A_s=70dB

a. Find the order required to design a Butterworth filter
b. Find the order required for a Chebyshev filter. Design the corresponding LPF for an attenuation of 0.5dB.

P6. A Chebyshev filter with Є=0.508 has an attenuation of 30dB at normalized frequency of 2. Find:

a. The passband ripple.
b. The order of the filter.
c. If f_{3dB}=5MHz, design a LPF.