

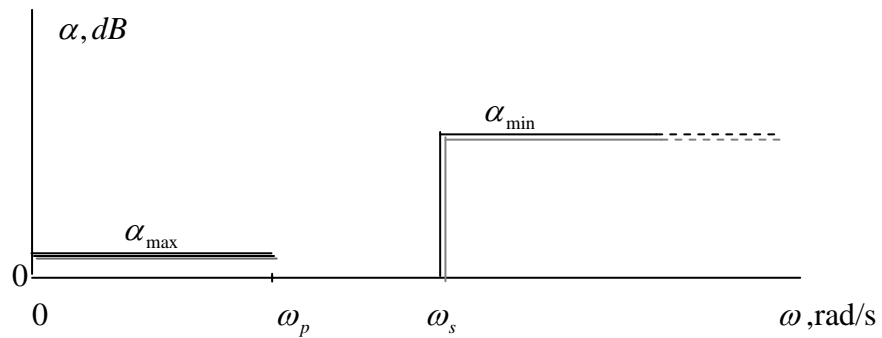
KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
Electrical Engineering Department
EE-416 Analog Filter Design
Instructor: Dr. Hussain Alzahr
Exam-I (061)

Name:

I.D.#

Serial #:

1) Design lowpass filters with **Chebyshev** and **Inverse-Chebyshev** responses satisfying the following specifications: $\alpha_{\max} = 0.1$ dB, $\alpha_{\min} = 30$ dB, $\omega_p = 1000$ rad/s, $\omega_s = 1400$ rad/s. Adjust the gain such that the dc gain becomes 0 dB. [5/15]



2) (a) Determine (estimate) the degrees necessary for maximally flat and Cauer (elliptic) filters to meet the following requirements.

$\alpha_{\max} [dB]$	$\alpha_{\min} [dB]$	$\omega_p [rad / s]$	$\omega_s [rad / s]$
1	40	1000	2000

(b) Determine the transfer functions of the above lowpass filters that meet the above specifications. **[6/15]**

3) Design a fourth-order Bessel-Thomson filter to provide 500- μ s delay. What are the filter's attenuation error and the delay error in the frequency band $0 \leq f \leq 2.6\text{kHz}$?

[4/15]