

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

Electrical Engineering Department

EE-416 Analog Filter Design

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Term Project

Due date Monday, Jan. 14, 2008

The general form of a second order notch filter transfer function is given by

$$T(s) = K \frac{s^2 + \omega_n^2}{s^2 + \frac{\omega_n}{Q}s + \omega_n^2}$$

where, ω_n is the notch frequency, Q is the quality factor, and K is the gain of the notch filter. The selectivity performance of a notch filter is characterized by its stop bandwidth, notch attenuation and passband ripple.

Part I:

Design a second order notch filter using ideal op-amp(s) to meet the following specifications:

1. Zero frequency at 60Hz.
2. Maximum possible Q .
3. Gain should be at least 1 (0dB).
4. The total capacitance of the filter should be no more than 50pF.

Part II:

Perform non-ideal analysis on the design of Part I to investigate the non-ideal effects of the op-amp(s) on the filter's performance. (Specially the effect of finite opamp gain).

Part III:

Use SPICE to test your design and verify the theoretical analysis of Part II.

Part IV: (Extra 5 Marks of final grades)

Implement your design using available op-amp(s) and test it using ELVIS, that can be used through LABVIEW.