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Design and Characterization of a 3rd Order Low-Pass Butterworth Filter

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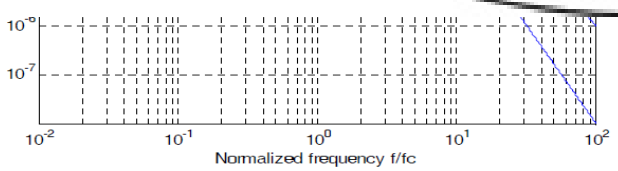


Figure 1: Frequency response of Butterworth filter of order n

The poles of a Butterworth filter are located on a circle with radius $\omega_c = 2\pi fc$ and are spaced apart by an angle $180^o/n$ in

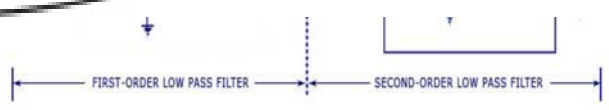


Figure 3: Low pass Butterworth filter of order 3

The magnitude equation of the 3rd order low pass filter is given by the expressions

$$\frac{V_{OUT}}{V_{IN}} = \frac{A_F}{\sqrt{1+\left(\frac{f}{f_C}\right)^6}} \quad (1)$$

where

$A_F = A_1 * A_2 =$ Pass band gain of the filter

$$A_1 = 1 + \frac{R_F}{R.} = \text{Gain of } 1^{st} \text{ stage} \quad (2)$$

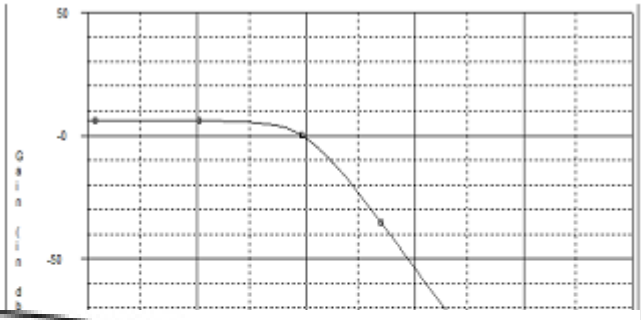
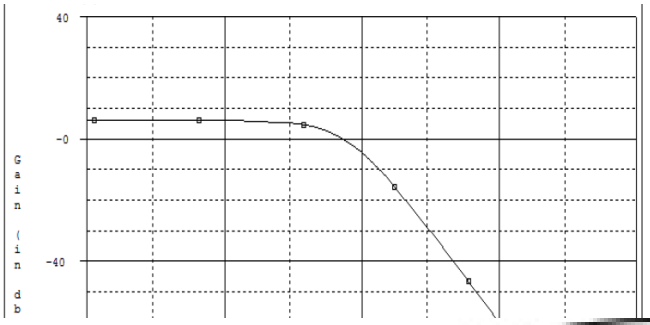


Figure 4: Schematic of Low pass Butterworth filter of order 3 for parameters given in Table 1

Table 2 is found to be 0.795 KHz. The frequency response plot of Figure 7 verifies it.



Shashank Soi is currently pursuing his B. Tech (2011-2015) from the department of Electronics and Communication Engineering at Dr. B. R. Ambedkar National Institute of Technology, Jalandhar, Punjab. His area of interest includes Microelectronic Circuits and Optoelectronics. He is also the author of the research paper on 'Image Analysis and Processing', published in International Journal of Emerging Technology and Advanced Engineering,, Volume 4 Issue 6, 2014.