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#Diego Butler



so many fake sites. this is the first one which worked! Many thanks

Schaumann: Design of Analog Filters
Chapter 1: Introduction

Introduction 1-1

1.1 The gain $G = 20 \log_{10}(V_2) = 20 \log_{10}(3.3) = 14.55$ dB
Phase shift $\Delta \phi = 0$ dB $\Rightarrow 0$ rad $\Rightarrow 0^\circ$

1.2 At 12 kHz, the gain of the filter is $G = 10^{10/20} = 1.2589 \times 10^5$
 \Rightarrow The magnitude of output signal is $V_2 = V_1 \times 1.2589 \times 10^5 = 125.9$ μ V.

1.3 $\sigma = 20 \log_{10}(10^{-3}) - 20 \log_{10}(10^{-6}) = -60$ dB

1.4 The gain is $G = 10^{10/20} = 10$, hence the output signal is $V_2 = V_1 \times 10 = 10 \times 10^{-6} = 10^{-5}$ V = 10 μ V.
 $\Rightarrow V_2 = 10 \mu$ V

1.5 (a) Lowpass. Transition bandwidth $BW_{tr} = 9.8 - 3.4 = 6.4$ kHz
(b) Bandpass. Transition bandwidth $BW_{tr} = 12.5 - 7 = 5.5$ kHz; $BW_{pass} = 40 - 24 = 16$ kHz
(c) Bandpass. Transition bandwidth $BW_{tr} = 12.5 - 7 = 5.5$ kHz; $BW_{pass} = 40 - 24 = 16$ kHz
(d) Highpass. Transition bandwidth $BW_{tr} = 40 - 24 = 16$ kHz
(e) Lowpass. Transition bandwidth $BW_{tr} = 400 - 300 = 100$ kHz
(f) Bandpass. Transition bandwidth $BW_{tr} = 1000 - 700 = 300$ kHz
 $BW_{pass} = 7.8 - 2.4 = 5.4$ MHz

1.6 At $\omega_c = 0$, hence the gain is $20 \log_{10}(1) = 0$ dB
At high frequencies $\omega \gg \omega_c$, attenuation $a(\omega) = 20 \log_{10}(1/\omega^2) = -40 \log_{10}(\omega)$ increases 40 dB per decade.
When $\omega = \infty$ (infinity), attenuation is infinite.

1.7 In this problem's solution, denormalized component values are denoted by "n".
Denormalized parameters are $R_n = R_n$, $L_n = L_n$, and $C_n = C_n$, therefore $R_n = 300$ Ω , $L_n = 300$ μ H, $C_n = 4.365$ μ F, $L_n = 3.875$ μ H, $C_n = 126.0$ μ F, $C_n = 77.44$ μ F

1.8 In this problem's solution, denormalized component values are denoted by "n". Since denormalized capacitance is $C_n = C_n / \omega_c$, where ω_c is the normalization radian, we have
 $R_n = R_n = 1$ Ω
 $L_n = L_n = 1$ μ H
 $C_n = C_n = 1$ μ F
Therefore the denormalized resistors are
 $R_n = R_n = 1$ Ω
 $R_n = R_n = 1$ Ω
 $R_n = R_n = 1$ Ω
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