SDM College of Engineering & Technology, Dharwad-02
Department of Electronics & Communication Engineering
V Semester

Course: Digital Signal Processing Laboratory **Course Code: 18UECL505**

Course Credits:1.5 **Date: 11.11.2022**

TERM WORK-III

Exp. No.	Problem statement	CO Mapping	Marks
7.	**Design of analog IIR filters**		
a.	Consider a low pass filter specification that has a -3dB bandwidth of 500Hz and an attenuation of 40dB at 1000Hz. Determine the order of the filter, Cut-off frequency and poles using Butterworth approximation (without using built-in function) Chebyshev approximation (without using built-in function) Comment on order of the filter. Verify the answers by manual calculation and using relevant built-in function.	**5**	**5**
b.	Consider the following specifications i. -2dB of attenuation at passband edge frequency of 20rad/sec. ii. -10dB of attenuation at passband edge frequency of 40rad/sec. Design an analog low pass Butterworth filter and Chebyshev filter type-1. (**Use buttord, butter, cheb1ord, cheby1 functions**) Note down following values: i. Cut-off frequency and Order of the filter ii. Transfer function H(s) iii. Plot the frequency response curve and note the stop band and pass band attenuation.	**5**	**5**
c.	Consider the specifications given in 7b and modify the same to design High Pass Filter using Butterworth filter and Chebyshev filter type-1. **(Use buttord, butter, cheb1ord, cheby1 functions)** Note down following values: i. Cut-off frequency and Order of the filter ii. Transfer function H(s) iii. Plot the frequency response curve and note the stop band and pass band attenuation.		
8.	**Design a digital IIR filter to be used in A/D-H(z)-D/A structure that simulates an analog filter for the given specifications and realize in direct form/cascade form/parallel form**		

a) Design a digital filter that satisfies the following requirements.
   i. -2dB at lower and upper cut-off frequency of 2 kHz and 4 kHz
   ii. -20dB at stop pass edge frequencies of 1 kHz and 5 KHz
   iii. Sample rate of 10000 samples/sec.
   Using bilinear transformation and impulse invariance method.

b) Consider the specifications given in **8a** and modify the same to design band stop filter using Bilinear Transformation.

9. Design of FIR filters for given specifications **4** **5**

a) To plot the frequency response of various windows:
   Plot the time and frequency domain response of various windows of window length, N=51. Measure the transition width of the main lobe and peak side lobe level in each case. Verify the result with theoretical values.
   Windows: Rectangular, Hamming, Hanning, Bartlett, Blackmann.

b) Design 17-tap FIR low pass and high pass filter with a cutoff frequency of 800 Hz and a sampling rate of 8000 Hz. Plot the magnitude and phase response.

10 **Applications of signal processing** **5** **5**

a) Generate AM signal of carrier frequency 1000 Hz and modulating frequency 100 Hz. Design a suitable filter to generate DSBSC. Further design another filter to get SSB. Analyze the spectrum in each case.

b) To study the effect of poles and zeros on the frequency response of any given system.

c) Time and Frequency domain analysis of audio signal.

Last date to complete term work-3: 12.12.2022

Lab In-charges **HOD (E&CE)**

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