(Pages : 3) **3842 P**

Candidate Code/Reg. No. : .....

Signature of Candidate : .....

VII Semester B.Tech. Degree Examination, June 2009
Branch : Electronics and Communication Engineering
LAB : DIGITAL SIGNAL PROCESSING LAB (TA)

Time: 3 Hours Max. Marks: 100

Instructions *:1) The candidate should enter his* ***Register No. / Candidate Code*** *and* ***signature*** *on* ***top*** *of the question paper.*

2) The ***Internal*** *and* ***External*** *Examiners should put their dated signature in the space* ***provided****.*

3) Question paper should be ***returned*** *along with the* ***answer script****.*

1. Write a modified linear convolver, conv_m (x, nx, y, ny) that produces the total result of linear convolution between two sequences x and y.

2. Generate a complex sine wave form containing two sine wave of amplitude 5 V and 2 V and frequency 100 Hz and 2000 Hz. Design a suitable IIR filter that will attenuate the high frequency component atleast by 30 dB. Apply the complex sine wave to the filter and plot the output.

3. Amplitude modulate a 15 KHz. Carrier signal with a modulating frequency of 2 KHz. Plot the waveform using MATLAB. Obtain the spectra of the modulated waveform.

4. Design a digital type I Chebyshev LPF operating at a sampling rate of 44.1 KHz. pass band frequency 2 KHz, pass band ripple 0.5 dB and stop band attenuation 50 dB at 10 KHz using impulse variance and bilinear information. Implement the filter using MATLAB. Find $\omega_p \omega_s$.

P.T.O.

5. Design a high pass filter meeting the following specifications : $\omega_s = 0.3\pi$, $\omega_p = 0.6\pi$, $A_s = 45\,dB$ and $R_p = 0.4\,dB$. Use Kaiser window and verify the design.

6. Write a MATLAB program to verify the time shifting property of DTFT.

7. Obtain PWM with a carrier waveform of frequency 10 KHz and a random binary modulating sequence. Display the waveform.

8. Design a digital Butterworth IIR band stop filter with the following specifications. N=12, Wc_1 = 0.2 z, Wc_2 = 0.5 z.

9. Using DSP board implement an FIR band stop filter for lower cut off frequency 1 KHz, upper cut off frequency 2 KHz. Sampling frequency is 16 KHz.

10. Verify the convolution property and multiplication property of DTFT.

11. Write a MATLAB program for simulation of a Digital Butterworth HPF using bilinear transformation for following specification in analog domain. Passband frequency fp = 5 KHz, attenuation at fp = 2 dB, stopband frequency fs = 2 KHz, attenuation as fs = 60 dB, sampling frequency = 48 KHz. Find the transfer function $H_{(s)}$, $H_{(z)}$ and plot the magnitude and Phase response of the filter.

12. Design a lowpass digital filter using Butterworth prototype and impulse invariance method to satisfy the specification. $W_p = 0.2\pi$, R_p = 1.0 dB, $W_{2s} = 0.3\pi$. A_s = 30 dB. Plot the magnitude and phase response and pole - zero positions.

13. Design a band stop filter using Hanning window design technique. The specifications are :

    Lower stop band edge = 0.4 π Upper stop band edge = 0.6 π

    Lower pass band edge = 0.3 π Upper pass band edge = 0.7 π

    Stop band attenuation = 40 dB Ripple factor = 0.5 dB

    Plot impulse response, magnitude response and phase response.

14. Write a MATLAB program to implement DFT and IDFT and verify the results using MATLAB functions.

15. Design a complex sinewaveform containing two sine wave of amplitude 5 V and 2 V and frequency 100 Hz and 2000 Hz. Design a suitable IIR filter that will attenuate the high frequency component atleast by 30 dB. Apply the complex sine wave to the filter and plot the output.

Date and Signature of Internal Examiner :

Date and Signature of External Examiner :