BTECH
(SEM V) THEORY EXAMINATION 2018-19
DIGITAL SIGNAL PROCESSING

Time: 3 Hours   *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   Attempt *all* questions in brief.   **2 x 7 = 14**

a) What is the main disadvantage of direct form realization?
b) What is the wraping effect?
c) Compare FIR and IIR filter?
d) What are the advantages of Kaiser window?
e) What is window and why it is necessary?
f) What is down sampling and up sampling?
g) Define decimation?

SECTION B

2.   Attempt any *three* of the following: **7 x 3 = 21**

a) Obtain the Cascade form realization-
$y(n) = y(n-1) - 1/2\,y(n-2) + 1/4\,y(n-2) + x(n) - x(n-1) + x(n-2)$

b) Find the order and cut off frequency of a digital filter with the following specification-

$0.89 <= |H(e^{j\omega})| <= 1$, $0 <= \omega <= 0.4\pi$

$|H(e^{j\omega})| <= 0.18$, $0.6\pi <= \omega <= \pi$ use the impulse invariance method?

c) The desired response of a low-pass filter is $H_d(e^{j\omega}) = e^{-3j\omega}$, $-3\pi/4 <= \omega <= 3\pi/4$

Determine $H(e^{j\omega})$ for M=7 using a hamming window.

d) Find the 8 point DFT of the sequence x(n)={1,1,1,1,1,0,0,0} using DIT FFT?
e) Discuss aboutQuadrature mirror filters in detail?

SECTION C

3.   Attempt any *one* part of the following: **7 x 1 = 7**

a) Obtain the parallel form realization-
$$H(z) = \frac{(1+1/2z^{-1})}{(1-z^{-1}+1/4z^{-2})(1-z^{-1}+1/2z^{-2})}$$

b) Obtain the Direct form I and II form realization
$$H(z) = \frac{(1+z^{-1})(1+2z^{-1})}{(1+1/2z^{-1})(1-1/4z^{-1})(1+1/8z^{-1})}$$

4. **Attempt any *one* part of the following:** 7 x 1 = 7

a) Using bilinear transformation, design a Butterworth filter which satisfies the following

condition $0.8 <= |H(e^{j\omega})| <= 1$, $0 <= \omega <= 0.2\pi$

$|H(e^{j\omega})| <= 0.2$, $0.6\pi <= \omega <= \pi$

b) What is the difference Butterworth and Chebyshev? Explain the frequency transformation is done?

5. **Attempt any *one* part of the following:** 7 x 1 = 7

a) Using a rectangular window technique design a low pass filter with passband gain of unity, cutoff frequency of 1000 Hz and working at a sampling frequency of 5 kHz. The length of the impulse response should be 7.

b) Discuss the Finite Word length effects in digital filters?

6. **Attempt any *one* part of the following:** 7 x 1 = 7

a) Find the linear convolution using circular convolution of the following sequence x(n)={1,2,1} h(n)={1,2}?

b) Find the 8 point DFT of the sequence x(n)={1,2,3,4,4,3,2,1} using DIF FFT?

7. **Attempt any *one* part of the following:** 7 x 1 = 7

a) What is multirate digital signal processing? Discuss about application areas of it.

b) Discuss about Interpolation and Sampling rate conversion in detail?