B.E (VII) EXTC Old
Discrete Time Sig. Processing

13/5/2016

QP Code : 29718

Time: 3 hrs **Marks: 100**

NOTE:
1) **Question No. I is compulsory.**
2) Attempt any **four** questions from the remaining **Six** questions
3) Assumptions made should be clearly stated.
4) Assume any suitable data wherever required but justify the same.

Q1 **20**

a) Find $y(n)$ using frequency domain analysis if $x(n) = \{1,2,-1\}$ *and* $h(n) = \{3,2\}$

b) Identify the following filters based on their passband by sketching their frequency response $h(n) = \{1,-0.5\}$

c) Obtain a digital filter transfer function H(ω) by applying Impulse invariance transformation on the analog TF

$$H_a(s) = \frac{s+2}{s^2+4s+3} \quad \text{Use } f_s = 1Ksa/sec$$

d) Find convolution of $x_1(n) = \{1,2,3,4\}$ *with* $x_2(n) = \{5,6,7,8\}$ when both the signals are periodic

Q2

a) Determine 8 point FFT for a continuous time signal using DIT FFT algorithm **10**

$x[n] = \{1,2,1,2,02,1,2\}$

b) $x(n) = \{1+5j,\ 2+6j,\ 3+7j,\ 4+8j\}$. **10**

i. Find DFT X(K)

ii. Using the results above and not otherwise find DFT of $x_1(n) = \{1,2,3,4\}$

Q3

a) Perform circular convolution and circular crosscorrelation of

$x_1(n) = cos\frac{2\pi n}{N}$ with $x_2(n) = sin\frac{2\pi n}{N}$ $0 \le n \le N-1$ **10**

b) One of the zeros of an anti symmetric FIR filter is at $0.5\angle 60°$. Show the locations of other zeros. What is the minimum order of this filter? Also find the transfer function and impulse response of this filter **10**

Q4

a) Consider the sequence $x[n] = 4\delta(n) + 3\delta(n-1) + 2\delta(n-2) + \delta(n-3)$. Let $X(K)$ be the six point DFT of $x(n)$. Find the sequence $w(n)$ that has six point DFT $W(K)$ such that $W(K) = Re\{X(K)\}$ **10**

b) Determine parallel and cascade form realization of **10**

$$H(Z) = 0.7\frac{1-0.36z^{-2}}{(1+0.1z^{-1}-0.72z^{-2})}$$

Q5

a) The desired response of a low-pass filter is **10**

$$H_d(\omega) = e^{-j3\omega} \qquad -\frac{3\pi}{4} \le \omega \le \frac{3\pi}{4}$$
$$= 0 \qquad \frac{3\pi}{4} \le |\omega| \le \pi$$

Determine the frequency response $H(e^{j\omega})$ for M=7 using a Hamming window

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b) Find poles of a low pass Butterworth filter for N=3. Sketch location of poles in s plane. Also find normalized transfer function. 10

Q 6

a) Explain the need of a low pass filter with a decimator and mathematically prove that $\omega_y = \omega_x D$ 10

b) Explain Goertzel's Algorithm 10

Q7 Write notes on 20

a) Interpolation process

b) Chirp Z Algorithm

c) Adaptive echo cancellation

d) Frequency sampling realization of FIR filters

BE. sem. VII (Rev) EXTC
Fundamentals of microwave Engg. 31/05/2016

QP Code : 29920

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question **No.1** is compulsory.
(2) Answer any **four** out of remaining **six** questions.
(3) Illustrate answers with sketches.
(4) Use of smith chart is compulsory.

1. (a) Explain amplification process in TWT. **5**
   (b) Differentiate between waveguides and transmission lines. **5**
   (c) With a neat diagram explain the working of a PIN diode. **5**
   (d) List out different characteristics of microwaves. **5**

2. (a) Mention different types of electron flow. Explain Brillouin flow and derive an expression for Brillouin magnetic field Br. **10**
   (b) Describe operation of O-type and M-type devices in brief. **10**

3. (a) Describe the mechanism of velocity modulation in a two cavity klystron and hence obtain an expression for the bunched beam current. Also find out condition for maximum power output. **10**
   (b) Explain the procedure of measurement of dielectric constant at microwave frequency. **10**

4. (a) What are the steps to solve a double stub matching problem? **10**
   (b) Using the multiple reflection viewpoint explain the principle of working of a quartor wave transformer. **10**

5. (a) Describe different modes of oscillation of Gunn Diode. **10**
   (b) Explain the working of a negative resistance parametric amplifier. **10**

6. (a) With neat diagrams explain the working of a Guun Diode. **10**
   (b) Explain the working of magic Tee. Design a circulator using Magic Tees. **10**

7. Write short notes on the following:
   (a) Hybrid junctions **5**
   (b) Power dividers **5**
   (c) Microwave filters **5**
   (d) Compare klystron with magnetron. **5**
