B.Tech. Degree VI Semester (Supplementary) Examination, November 2005

CS/EI/EE 601 DIGITAL SIGNAL PROCESSING

(2002 Admissions)

Time: 3 Hours Maximum Marks: 100

I a) Explain the different basic properties of discrete system with example. (8)

b) Check the y(n)=nx(n) system are time invariant, Linear as static (6)

c) Explain the classification of discrete time signals. (6)

OR

II a) Evaluate the convolution y(n)=x(n)*h(n) of the sequence

$x(n) = \{1,1,0,1,1\}$ (↑ at 1) and $h(n) = \{1,-2,-3,4\}$ (↑ at 1) (7)

b) Explain the important properties of the ROC of the z-transform. (5)

c) Determine the causal signals x(n) having z-transform $x(z) = \frac{1}{(1+z^{-1})(1-z^{-1})^2}$ (8)

III a) Find the convolution of the two signals $x(n) = u(n)$ and $h(n)=a^n u(n)$ ROC $|a| < 1, n \geq 0$. (10)

b) Explain any five properties of DFT. (10)

OR

IV a) Find the 4 point DFT of the seg $x(n) = \frac{\cos n\pi}{4}$. (10)

b) Explain the Radix-2 DIT FFT algorithm. (10)

V a) Determine direct form I and II and cascade form for the realization for the transfer $f \wedge$ of an FIR system is given by $H(z) = (1-\frac{1}{4}z^{-1}+\frac{3}{8}z^{-2})(1-\frac{1}{8}z^{-1}-\frac{1}{2}z^{-2})$ (9)

b) Discuss the cascade realisation of FIR system. (4)

c) Design FIR filter using FS method and discuss Cribb's oscillation and how to reduce cribb's oscillations. (7)

OR

VI a) The desired response of a LPF is $Hd(e^{j\omega}) = \begin{cases} e^{-j3\omega} & \frac{-3\pi}{4} \leq |\omega| \leq \frac{3\pi}{4} \\ 0 & \frac{3\pi}{4} < |\omega| \leq \pi \end{cases}$

Determine $H(e^{-j3\omega})$ for M=7 using a Hamming window. (10)

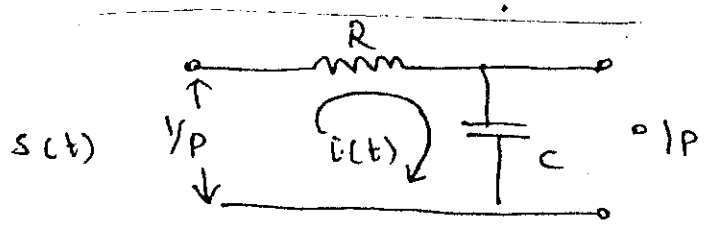
b) A LPF has the desired response as $Hd(e^{j\omega}) = \begin{cases} e^{-j3\omega} & 0 \leq \omega \leq \pi/2 \\ 0 & \pi/2 \leq \omega \leq \pi \end{cases}$

Determine the filter co-efficients h(n) for M=7 using type I frequency sampling techniques. (10)

(Turn Over)

VII a) Compare Butterworth and Chebychev filter. (4)

b) Convert the following analog filter into digital filter using impulse invariant method. (6)



(c) Obtain direct form I and II cascade and parallel form realization for the following system.

$$y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$$ (10)

OR

VIII a) What is the mapping procedure between S plane and Z plane in the method of mapping of differential? What are its characteristics? (6)

b) Design a Chebychev filter for the following specification.

$$0.8 \le \left|H(e^{j\omega})\right| \le 1 \qquad 0 \le \omega \le 0.2\pi$$

$$\left|H(e^{j\omega})\right| \le 0.2 \qquad 0.6\pi \le \omega \le \pi$$

using i) bilinear and (ii) impulse invariant method. (14)

IX a) Write ***short notes*** on:

i) Limit cycle oscillations

ii) Quantization effecting the computation of DFT. (10)

b) Explain the application of DSP in image processing. (10)

OR

X a) Draw and explain the architecture of a typical DSP processor. (10)

b) What are the effects of finite word length in digital filter? Explain the Rounding and Truncation error. (10)

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