R09

Code No: D7507

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
ADVANCED DIGITAL SIGNAL PROCESSING
(CONTROL SYSTEMS)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1.a) What are the various building blocks required in realization of digital systems?
b) Implement the following difference equation using cascade and parallel structure
$y(n)+y(n-1)+4y(n-2)-2y(n-3) = x(n)-2x(n-2)$.

2.a) Explain frequency warping effect in bilinear transformation and how it can be avoided.
b) Compute the poles of an Analog Chebyshev filter TF that satisfies the Constraints
$0.707 \leq |H(j\Omega)| \leq 1 \quad ; 0 \leq \Omega \leq 2$
$|H(j\Omega)| \leq 0.1 \; ; \Omega \geq 4$
and determine Ha(s) and hence obtain H(z) using Bilinear transformation.

3. a) FIR filters are always stable and can have linear phase characteristics. Justify.
b) Design an FIR Digital Band stop filter using rectangular window whose upper and lower cut off freq's are 4 & 5 rad/s and length of window N=9. Realize the filter using linear phase constraint.

4.a) Define DFT and IDFT.
b) Compute 8-point DFT of given sequence x(n) = {1,2,3,4,4,3,2,1} and also compute IDFT for the result obtained with DFT and verify whether the original sequence is obtained or not.

5.a) Define and discuss various types of errors that occur due to representation of data with finite word length.
b) Discuss finite word length effects w.r.t various realization structures (Direct form–I, Direct form–II) of IIR filters.
c) Discuss the effect ADC Quantization noise and Signal quality on the system output.

6.a) Discuss Fixed and Floating point representation of numbers.
b) Compute 1's complement and 2's complement addition of given numbers +68 and -58.

7. a) Discuss in brief about Welch method of Power Spectrum Estimation.
b) Determine the frequency resolution of Bartlett, Welch, and Blackman-Tukey methods of power spectrum estimates for a quality factor Q=10. Assume that overlap in Welch method is 50% and length of sample sequence is 1024.

8. a) Discuss how to estimate power spectral density of a given signal using Blackman-Tukey method.
b) Compare various Non-Parametric methods of power spectrum estimation w.r.t Computational complexity, Figure of Merit and resolution.

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