NR/R09

Code No: B5408/D7507

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech II - Semester Examinations, October/November 2011

ADVANCED DIGITAL SIGNAL PROCESSING

(COMMON TO POWER ELECTRONICS & ELECTRIC DRIVES, CONTROL SYSTEMS)

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

Answer any five questions

All questions carry equal marks

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1.a) Discuss Direct Form, Cascade and Linear Phase realization structures of FIR systems.
b) Discuss the computational complexity of digital filter structures. [12]

2.a) Compare Butterworth and Chebyshev analog approximation filter design techniques.
b) Design a Digital Chebyshev HPF using Bilinear transformation technique for the following specifications

$0.9 \leq |H(w)| \leq 1 \quad ; 0 \leq w \leq 0.4\pi$

$|H(w)| \leq 0.24 \; ; 0.5\,\pi \leq w \leq \pi$ [12]

3.a) Derive the necessary and sufficient conditions for the FIR filter to have linear phase characteristics.
b) Design an FIR Band pass filter using Hamming window of length 11 samples and lower and upper cut-off frequencies of 1 & 2 rad/s respectively. [12]

4.a) Define DFT & IDFT. State any four Properties of DFT.
b) Find X(K) of the given time domain sequence x(n) = {1,2,3,4,5,6,7,8} [12]

5.a) Define Limit Cycles and explain its types in detail.
b) Discuss finite word length effects in the implementation of FFT algorithms. [12]

6.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. [12]

7.a) Discuss in detail about fixed and floating point representation of numbers.
b) Discuss in detail about Addition overflow errors and their remedies. [12]

8. Write a short note on
a) Bartlett method of power spectrum estimation.
b) Scaling methods to prevent saturation due to finite word length effects. [12]

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