Code No: A6502, A3802 **NR**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I Semester Examinations, October/November-2011
ADVANCED DIGITAL SIGNAL PROCESSING
(COMMON TO WIRELESS AND MOBILE COMMUNICATIONS, DIGITAL ELECTRONICS & COMMUNICATION SYSTEMS)

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

Answer any five questions
All questions carry equal marks

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1. a) Define DFT and IDFT. State the properties of DFT
   b) Perform the convolution of the given two sequences x(n) = {1,2,3,4} and h(n) = {5,6,7,8} using DFT and IDFT. [12]

2. a) Discuss Radix- r algorithm and hence discuss radix-2 algorithm
   b) Compute FFT of the given sequence x(n) = {1,2,3,4,5,6,7,8} using DIT-FFT Algorithm. [12]

3. a) Compare Butterworth and Chebyshev approximation techniques of filter designing.
   b) Design a Digital Butterworth LPF using bilinear transformation technique for the following specifications

$$0.707 \leq |H(w)| \leq 1 \quad ; 0 \leq w \leq 0.2\pi$$
$$|H(w)| \leq 0.08 \; ; 0.4\,\pi \leq w \leq \pi$$

[12]

4. a) Compare various windowing techniques w.r.t Beamwidth and Sidelobes
   b) Design a High Pass FIR filter whose cut-off frequency is 1.2 radians/sec and N=9 Using Hamming Window. [12]

5. a) Explain how aliasing effect can be avoided while performing decimation process of a signal by a factor D.
   b) Explain the implementation of Polyphase structure for Decimators. [12]

6 .a) Discuss in detail about Addition overflow errors and their remedies.
   b) Discuss the Coefficient word length requirements to achieve Stability and desired frequency response. [12]

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 1000. [12]

8. Bring out the Comparison between any two of the following
   a) FIR and IIR Filters w.r.t Phase, Stability, Computations
   b) Parametric and Non-Parametric Methods of Power Spectrum Estimation
   c) Fixed and Floating Point Representation with examples. [12]

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