Code :R5320201 **R5**

III B.Tech II Semester(R05) Supplementary Examinations, April/May 2011
DIGITAL SIGNAL PROCESSING
(Electrical & Electronics Engineering, Electronics & Communication Engineering, Electronics & Instrumentation Engineering, Electronics & Control Engineering, Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) What are the advantages and disadvantages of digital signal processing over analog signal processing? Explain.
   (b) Check the given system for:
      i. Linearity
      ii. Causality
      iii. Stability
      iv. Time invariance.

2. (a) Compute the discrete Fourier transform of each of the following finite length sequences considered to be of length N.
      i. $x(n) = \delta(n)$
      ii. $x(n) = \delta(n - n_0)$ where $0 < n_0 < N$
      iii. $x(n) = a^n$ $0 \le n \le N - 1$
   (b) Let $x_2(n)$ be a finite duration sequence of length N and $x_1(n) = \delta(n - n_0)$ where $n_0 < N$. Obtain the circular convolution of two sequences.

3. (a) Implement the Decimation in frequency FFT algorithm of N-point DFT where N-8. Also explain the steps involved in this algorithm.
   (b) Compute the FFT for the sequence x(n) = { 1, 1, 1, 1, 1, 1, 1, 1 }

4. (a) With reference to Z-transform, state the initial and final value theorem.
   (b) Determine the causal signal x(n) having the Z-transform $X(Z) = \frac{Z^2+Z}{(Z-\frac{1}{2})^2(Z-\frac{1}{4})}$.

5. (a) Compare Butterworth filter and chybeshev filter approximations
   (b) Convert the analog filter to a digital filter whose transfer function is
   $H(s) = 36/(s + 0.1)^2+36$
   Use bilinear transformation with $\omega_r = 0.2\pi$.

6. (a) Give the comparison of FIR and IIR filters.
   (b) Express the different window functions used in FIR filter design and sketch the plots in time domain.

7. Consider the signal $x(n) = a^n u(n)$, $|a| < 1$
   (a) Determine the spectrum of a signal.
   (b) The signal is applied to a decimator that reduces sampling rate by a factor by '2'. Determine its output spectrum.
   (c) Show that the spectrum in part (ii) is simply Fourier transform of x(2n).

8. Explain the evolution of TMS 320 DSP processors family.

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