GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. IST Semester–Remedial Examination – July- 2011
Subject code: 710422
Subject Name : Digital Signal Processing and Applications

Date:15/07/2011   **Time: 10:30 am – 01:00 pm**
                                                       Total Marks: 60

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Define stable and causal system .Give an example of LTI system expressed by a difference equation.   **06**

(b) Differentiate between DTFT and DFT with the help of mathematical expressions.   **06**

Q.2 **(a)** Determine the Z-transform for the sequence x[n]=0.5^n u[n].Specify its ROC also.   **06**

(b) Determine the inverse Z-transform using power series for
$X(z)=\ln(1-4z),|z|<1/4$.   **06**

OR

(b) Determine the inverse Z-transform using long division for
$X(z)=(1-0.33z^{-1})/(1+0.33z^{-1})$ for a right sided sequence x[n].   **06**

Q.3 **(a)** Describe properties of DFT.   **06**
(b) Explain circular convolution with the help of an example.   **06**

OR

Q.3 **(a)** Describe properties of DTFT.   **06**
(b) Explain linear convolution with the help of an example.   **06**

Q.4 **(a)** For the system function   **06**

$H(z)=(1+2z^{-1}+z^{-2})$ / $[1-(3/4)z^{-1}+1/3z^{-2}]$,draw flow graphs of all possible realizations for this system as cascade of first order systems.

(b) Compute the DFT of the following finite length sequences considered to be of length N (N is even):   **06**
(i)   x[n]= δ[n]
(ii)   x[n]= δ[n-5]

OR

Q.4 **(a)** Give differences between DIT and DIF FFT algorithms.   **06**
(b) A continuous time signal is sampled at a sampling rate of 10 kHz and the DFT of 1024 samples computed. Determine the frequency spacing between spectral samples. Justify your answer.   **06**

Q.5 **(a)** Describe windowing method for FIR filter design.   **06**
(b) Compare FIR and IIR filter designs.   **06**

OR

Q.5 **(a)** Discuss DSP applications to radar engineering.   **06**
(b) With the help of a neat sketch, explain Digital Signal Processor architecture   **06**

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