Total No. of Questions :10] *[Total No. of Printed Pages :3*

Roll No .....

EX - 703

B.E. VII Semester

Examination, December 2012

Digital Signal Processing

Time : Three Hours

Maximum Marks : 100 ***Minimum Pass Marks :35***

Note: Attempt *One* question from each unit
All questions carry equal marks.

UNIT I

1 (a) Examine the following systems with respect to the properties - linearity, Time variance, causality and stability.

(i) $y(n) = x(-n+2)$

(ii) $y(n) = x(2n)$

(iii) $y(n) = \sum_{k=-\infty}^{n} x(k)$

(b) Determine the Fourier transform of the signal

$x(n) = a^{|n|}, -1<a<1$

OR

2. (a) State and prove the following properties of DTFT
(i) Multiplication of two sequence
(ii) Differentiation in the frequency domain

(b) Discuss discrete time processing of continuous time signals

UNIT II

3. (a) Determine the step response of the system

$$y(n) = \alpha y(n-1) + x(n) \quad -1 < \alpha < 1$$

when the initial condition is y (-1) = 1

(b) Determine the transient and steady state responses of the system characterized by the difference equation.

y(n) = 0.5 y (n-1) +x (n)

when the input signal is $x(n) = 10\cos(\pi n/4)u(n)$. The system is initially at rest

OR

4. A LTI system is characterised by the system function

$$H(z) = \frac{3 - 4z^{-1}}{1 - 3.5z^{-1} + 1.5\,z^{-2}}$$

Specify the ROC of H (z) and determine h (n) for the following condition

(i) The system is stable

(ii) The system is causal

(iii) The system si anti causal

UNIT III

5. (a) Perform the circular convolution of the following sequences.

$$x_1(n) = \{2, \underset{\uparrow}{1}, 2, 1\}$$

$$x_2(n) = \{1, \underset{\uparrow}{2}, 3, 4\}$$

(b) Derive the signal flow graph for the N=16 point, radix - 4, decimation in time FFT algorithm

OR

6. Compute the eight point DFT of the sequence

$$x(n) = \begin{cases} 1, 0 \le n \le 7 \\ 0, \textit{otherwise} \end{cases}$$

by using the decimation in frequency FFT algorithm

UNIT IV

7. (a) Explain the bilinear transformation method for designing IIR filter.

(b) Convert the analog filter with system function

$$Ha(S) = \frac{S + 0.1}{(S+0.1)^2 + 9}$$

into a digital IIR filter by means of the impulse invariance method.

OR

8. (a) Discuss Butterworth analog filter approximation for IIR digital filter.

(b) Explain canonic realization of IIR digital filter

UNIT V

9. Discuss the designing of FIR filter using Kieser window.

OR

10 Discuss the designing of FIR filter using rectangular window.

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