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OR

0. Write short note on any two of the following:

a) Hilberts transform

b) Estimation from samples

c) Basic principles of spectrum estimation

d) Multi-rate signal processing

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Roll No .....

MEDC-103

M.E./M.Tech. I Semester

Examination, December 2015

DSP Application

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any one question from each units.

ii) All questions carry equal marks.

iii) Total five questions to be answered.

Unit - I

1. Verify the following systems for various discrete time properties like linearity, time variant, causality, stability and memory.

a) $T[x(n)] = g[n]x(n)$

b) $T[x(n)] = \sum_{k=n_0}^{n} x(k)$

c) $T[x(n)] = x(n-n_0)$

d) $T[x(n)] = e^{x(n)}$

e) $T[x(n)] = x(-n)$

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OR

2. Indicate and prove which of the following discrete time signals are Eigen functions of stable, linear and time-invariant discrete time systems.

   a) $e^{j2\pi n/3}$ b) 3^n

   c) $2^n u(-n-1)$ d) $\cos(\omega_0 n)$

Unit - II

3. An LTI (Discrete-time) system is characterised by the system function. $H(Z) = \dfrac{3-4z^{-1}}{1-3.5z^{-1}+1.5z^{-2}}$

   specify the ROC of $H(Z)$. Also find unit sample response $h(n)$ for the following conditions:

   a) The system is stable

   b) The system is causal

   c) The system is anticausal

OR

4. Determine the inverse Z-transform of $S(Z) = \dfrac{2}{2-3z^{-1}+z^{-2}}$

   by long division method

   When a) ROC: $|Z| > 1$

   b) ROC: $|Z| < 1/2$

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Unit - III

5. Find the DFT of the following discrete-time sequence

   $s(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}$

   Using Radix-2 Decimation-In-Time (DIT) FFT algorithm.

OR

6. Find the DFT of the following discrete-time sequence

   $s(n) = [1, -1, -1, -1, 1, 1, 1, -1]$

   Using Radix-2 Decimation-In-Frequency (DIF) FFT algorithm

Unit - IV

7. Find the Butter worth circle in the Z-plane and the corresponding pole-locations for a third order Butterworth analog filter. Given $B_1 = 1/4$ and $\Omega_1 = 1$ in the S-plane.

OR

8. Discuss about the Blackman window function and give all the steps of design of FIR filters using Blackman window.

Unit - V

9. Write short note on any two of the following:

   a) Auto-Covariance and cross-covariance

   b) Estimate of power density spectrum

   c) Wavelet Transform

   d) Haar Transform