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 Roll No.....

MEDC-103

M.E./M.Tech. I Semester

Examination, June 2017

DSP Application

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) What is a LTI system? Explain giving some examples what is the importance of impulse response to LTI system?
   b) Define convolution. Compute the convolution of following signals

$x_1(n) = [4, -2, 1]$

$$x_2(n) = \begin{cases} 1 & 0 \le n \le s \\ 0 & otherwise \end{cases}$$

2. a) What do you understand by ROC of Z transforms? Write properties of ROC for various types of signals.
   b) Determine Z transform of the following system.
   i) $a^n\, u(n)$
   ii) $(\cos w_0 n)\, u(n)$

3. a) Determine the causal signal $x(n)$ whose Z transform is given by $X(z) = \dfrac{1+z^{-1}}{1-z^{-1}+0.5z^{-2}}$

   b) Define, explain and differentiate recursive and non-recursive system.

4. a) Differentiate:
   i) Linear and circular convolution
   ii) DFT and DCT
   b) Obtain DFT of the following sequence
   i) $x(n) = \underset{\uparrow}{(1, 0, -1, 2)}$
   ii) $x(n) = \underset{\uparrow}{(1, -1, 0, 2, 1, -2, -1, 1)}$

5. a) Define FIR and IIR system compare them and give their basic structure.
   b) Explain Bilinear transformation method for designing digital filters.

6. a) Describe designing of FIR filter using Kaiser window.
   b) Discuss the effect of finite register length in filter design.

7. a) Describe response of linear system to random signals.
   b) Explain wavelet transform and discuss various applications of wavelet transform.

8. Write short notes on any two of the following:
   a) Decimation in Time FFT algorithm
   b) Butterworth filter
   c) Basic principals of spectrum estimation
   d) Multi rate signal processing