

Total No. of Questions : 8]

[Total No. of Printed Pages : 2

Roll No.....

**MEDC-103****M.E./M.Tech. I Semester**

Examination, December 2017

**DSP Application****Time : Three Hours****Maximum Marks : 70**

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

- Examine the following system whether they are stable, causal and LTI
  - $y(n) = x(-n+2)$
  - $y(n) = x(n)u(n)$
  - $y(n) = x(n^2)$
  - $y(n) = x(n)\cos(\omega_0 n)$
  - $y(n) = |x(n)|$
- Determine the output  $y(n)$  of a relaxed linear time invariant system with impulse response.  
 $h(n) = a^n u(n), |a| < 1$   
 When the input is a unit step sequence that is  
 $x(n) = u(n)$
  - Explain about Recursive and Non-Recursive system.

[2]

- Determine the Z-transform of following:
  - $-a^n u(-n-1)$
  - $na^n u(n)$
  - $(\cos \omega_0 n) u(n)$
  - $(a^n \sin \omega_0 n) u(n)$

- Determine the inverse Z-transform of the following:
  - $X(z) = \log(1+az^{-1}) \quad |z| > |a|$
  - $X(z) = \frac{2-1.5z^{-1}}{1-1.5z^{-1}+0.5z^{-2}}$
  - $X(z) = \frac{1-az^{-1}}{z^{-1}-a}$

- Explain the linear and circular convolution property of DFT.
  - What is the relationship between DFT and DCT?
- Explain Butterworth method for designing IIR filter.
  - Explain the impulse invariance method for designing digital filter.
- Discuss about multirate signal processing.
  - Discuss the basic principle of spectrum estimation
- Write short notes on any two of the following:
  - Radix 2 FFT algorithm
  - Hilbert's transform
  - Wavelet transform

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