

Roll No .....

**EC-8004 (1) (CBGS)**

**B.E. VIII Semester**

Examination, May 2019

**Choice Based Grading System (CBGS)**

**Advanced Digital Signal Processing**

*Time : Three Hours*

*Maximum Marks : 70*

**Note:** i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Classify and explain different types of signals and systems.  
b) Determine if the system described by the following input output equation are linear time invariant or not.
  - i)  $y(n) = nx(n)$
  - ii)  $y(n) = e^{x(n)}$
  - iii)  $y(n) = x^2(n)$
  - iv)  $y(n) = x(2n)$
2. a) Determine the Z-transform of the signal  $x(n) = na^n u(n)$ .  
b) Determine the signal  $x(n)$  whose Z-transform is given by  
$$X(z) = \log(1 + az^{-1}) \quad |z| > |a|$$
  
c) Determine the causal signal  $x(n)$  whose Z-transform is

$$\text{given by } X(z) = \frac{1 + z^{-1}}{1 - z^{-1} + 0.5z^{-2}}$$

3. a) Discuss about average spectrum representation of infinite energy signals.  
b) Discuss about cross covariance and cross spectrum.
4. a) State and prove any three properties of DFT.  
b) Explain linear convolution using DFT.
5. Compute  $N = 8$  point DFT using Radix-2 decimation in time FFT algorithm.
6. a) Discuss the design of digital filter based on least square method. <http://www.rgpvonline.com>  
b) Compare IIR and FIR digital filters.
7. a) Discuss forward and backward linear prediction.  
b) Discuss filter design and implementation for sampling rate conversion.
8. Write short notes any two of the following.
  - i) Response of linear system to random signals
  - ii) Estimation of the auto covariance
  - iii) Two dimensional DFT

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