Total No. of Questions :5] *[Total No. of Printed Pages :2*

Roll No .....

EI/IC-603

B.E. VI Semester

Examination, June 2016

Digital Signal Processing

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Determine the Fourier transform of $u(n)$.

   b) Determine the Fourier transform of $x(n)=\cos\sqrt{2}\,\pi n$

   c) Differentiate between discrete Fourier series and discrete Fourier transform.

   d) Explain the linear convolution using DFT.

   OR

   Discuss about the two dimensional DFT.

Unit - II

2. a) Draw the basic Direct form structure of FIR system.

   b) Considering a two pole and two zero IIR system draw signal flow graph.

   c) Write the names of basic network structures for IIR and FIR systems.

   d) Discuss Tellegen's theorem for digital filters and give its applications.

   OR

   Determine the system function H(z), the impulse response h(n) and the state transition matrix ϕ (n) of the system

that generates the Fibonacci sequence. This system is described by the state-space equation.

$$v(n+1)=\begin{bmatrix}0 & 1\\ 1 & 1\end{bmatrix}v(n)+\begin{bmatrix}0\\ 1\end{bmatrix}x(n)$$

$$y(n)=\begin{bmatrix}1 & 1\end{bmatrix}v(n)+x(n)$$

Unit - III

a) Name the methods for designing FIR filters.

b) Name the techniques for designing IIR filters.

c) What is Gibbs phenomenon.

d) Discuss how to design a linear phase FIR filters by frequency sampling method.

OR

Discuss bilinear transformation method for designing IIR filter from analog filter.

Unit - IV

4. a) Name the efficient computation methods for DFT.

   b) For an 12 point DFT which efficient computation method should be used and why.

   c) Write briefly about Goertzel algorithm.

   d) Derive the signal flow graph for the N = 8 point, radix 2 decimation in frequency FFT algorithm.

   OR

   Write short note on chirp-2 transform.

Unit - V

a) What are Discrete random signals.

b) When does we consider random process ergodic.

c) What is the basic principle of spectrum estimation.

d) Write short note on the response of linear system to random signals.

OR

Discuss briefly about cross covariance and cross spectrum.

******