Total No. of Questions :10]   [Total No. of Printed Pages :4

Roll No ....

EI/IC-603

B.E. VI Semester

Examination, June 2017

Digital signal Processing

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt all questions.
ii) Each question carries equal marks.

Unit - I

1. a) How do we derive DFT from DFS. Explain in detail.   7
    b) How does DFT differs from DTFT. Explain and justify the answer.   7

OR

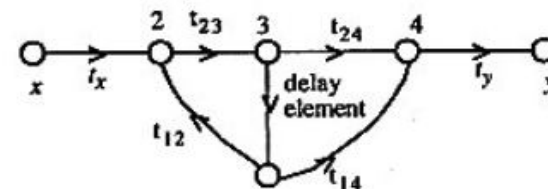2. a) Convolve following sequences using DFT.   7

$$x(n) = \left\{ \underset{\uparrow}{1}, 2, 3, 4 \right\}$$

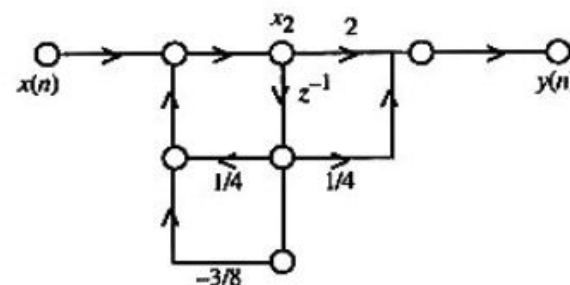$$h(n) = \left\{ 1, 1, \underset{\uparrow}{2}, 1 \right\}$$

b) State and prove the following: 7
    i) Frequency shifting property
    ii) Time sealing
    iii) Symmetry

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Unit - II

3. a) For the given signal flow graph related y and x using matrix representation.   7

b) Figure given below represents the system. Find the difference equation and transfer function of the system.   7

OR

4. a) Consider the LSIV system defined by the difference equation.   7

$$y(n) = \left(\frac{3}{4}\right) y(n-1) - \left(\frac{1}{8}\right) y(n-2) + x(n) + \left(\frac{1}{3}\right) x(n-1)$$

Draw a canonic realization for this system using continued fraction expansions method described above.

b) Explain Tellegen's theorem and Intereciprocity.   7

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Unit - III

5. a) Make comparison of IIR and FIR digital filters.   7

   b) Explain matched Z-transform method of IIR filter design.   7

OR

6. a) Explain the following terms: 7

   i) Window function

   ii) Gibbs phenomenon

   iii) Stable and casual filter

   b) Explain the following: 7

   i) Aliasing error

   ii) Prewarping

   iii) Impulse invariance

Unit - IV

7. a) Explain periodicity and symmetry property of phase rotation factor.   7

   b) If $x(n) = 2^n$ for $n = 0, 1, 2, 3$ find DFT $X(K)$ of $x(n)$ using DIT algorithm.   7

OR

8. Consider two 4-point sequences $x(n)$ and $h(n)$ defined as follow: 14

   $x(n) = \cos(n\,\pi/2)$, $n = 0, 1, 2, 3$ and

   $h(n) = 2^n$, $n = 0, 1, 2, 3$.

   a) Calculate the 4-point DFT of $x(n)$ that is $x(k)$

   b) Calculate the 4-point DFT of $h(n)$, that is $H(k)$

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c) Calculate $y(n) = $ IDFT of $[X(k)\,H(k)]$

d) Verify the sequence values $y(n)$ by performing circular convolution.

Unit - V

a) Explain basic principle of power speeding estimation.   7

b) Find out the response of linear system to random signals.   7

OR

Write short notes on any two of the following: 14

a) Correlation

b) Covariance

c) Cross covariance

d) Average spectrum

e) Chirp - Z - Transform

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