

7E4045

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B.Tech. VII Semester (Main) Examination - 2013
Electronics Instrumentation & Control
7E12 Digital Signal Processing
Common with 7EC2

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.) rtuonline.com

Unit - I

1. a) How Band limited signal can be reconstruct from its samples? (8)
- b) Explain continuous time processing of discrete time signals. (8)

OR

1. a) Define discrete time processing of continuous time signals. (8)
- b) By help of a suitable block diagram & derivation explain the concept of decimators & interpolators. (8)

Unit - II

2. a) Discuss minimum phase & all pass system along with suitable examples. (8)
- b) Determine the current value of output $y(n)$ of a discrete time LTI system which is described by $y(n) = x(n) + \frac{1}{3}y(n-1)$ (8)

OR

2. a) Explain the concept of linear system with linear phase? (8)
- b) The input & output of the system are given by

$$x(n) = \left(\frac{1}{2}\right)^n U(n); y(n) = \left(\frac{1}{2}\right)^n U(n) + 2\left(\frac{1}{3}\right)^n U(n) \text{ determine the LCCD equation.} \quad (8)$$

Unit - III

3. a) Explain Basic Structures for IIR for discrete time system? (6)
- b) Obtain the direct form I, direct form II, Cascade & Parallel form realization for the following system.

$$y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2) \quad (10)$$

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(1)

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OR

3. a) Explain Basic Structures for FIR System for discrete time system? With suitable example. (8)
- b) Determine direct form & cascade form realisation for the transfer function of an FIR digital filter which is given by

$$H(z) = \left(1 - \frac{1}{4}z^{-1} + \frac{3}{8}z^{-2}\right) \left(1 - \frac{1}{8}z^{-1} - \frac{1}{2}z^{-2}\right) \quad (8)$$

Unit - IV

4. a) For Analog Filter Design explain Butter worth filter with a suitable diagram? (8)
- b) Given an analog transfer function as follows :

$$H(s) = \frac{1}{(s+1)(s+2)}$$

Obtain H(z) using impulse invariant design method take $\alpha = 1s$. (8)

OR

4. a) For Design of FIR filters by windowing explain the concept of Rectangular, Hanning, Hamming & Kaiser? (8)
- b) Its required to design a digital filter with a 3dB band width of 0.2π from an analog filter having the following system response :

$$H_o(s) = \frac{\Omega_c}{s + \Omega_c}$$

Using bilinear transformation, Obtain H(z). (8)

Unit - V

5. a) Explain discrete Fourier transform & its properties. (8)
- b) Find the response of an FIR filter with impulse response $h(n) = \{1, 2, 4\}$ to the input sequence $x(n) = \{1, 2\}$ (8)

OR

5. a) Explain decimation in time and decimation in frequency FFT algorithms for efficient computation of the DFT. (8)
- b) Given a sequence $x(n) = \{0, 1, 2, 3, 4, 5, 6, 7\}$, determine X(k) using DIT FFT algorithm? (8)