7E4045

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# 7E4045

## B.Tech. VII Semester (Main) Examination - 2013
## Electronics Instrumentation & Control
## 7EI2 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.)*

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### 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 $x(n) = \left(\frac{1}{2}\right)^n U(n)$; $y(n) = \left(\frac{1}{2}\right)^n U(n) + 2\left(\frac{1}{3}\right)^n U(n)$ determine the LCCD equation. **(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.
   $y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$ **(10)**



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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

$$H(z)=\left(1-\frac{1}{4}z^{-1}+\frac{3}{8}z^{-2}\right)\left(1-\frac{1}{8}z^{-1}-\frac{1}{2}z^{-2}\right)$$ **(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 $\varsigma$ =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 $0.2\pi$ from an analog filter having the following system response :

$$H_a(s)=\frac{\Omega c}{S+\Omega c}$$

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)**

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