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Question Paper Code : 41001

11/05/18

FV

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fourth Semester

Electrical and Electronics Engineering

EE 6403 – DISCRETE TIME SYSTEMS AND SIGNAL PROCESSING

(Common to Electronics and Instrumentation Engineering/Instrumentation and Control Engineering)

(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. What is aliasing effect ?
2. List the sampling techniques.
3. What is the inverse Z transform of $H(Z) = \frac{2Z}{Z - \frac{1}{2}}$?
4. What is zero padding ?
5. Find the DFT sequence of $x(n) = \{1, 1, 0, 0\}$.
6. What is meant by radix-4 FFT ?
7. Obtain the direct form-I realization for the given difference equation $y(n) = 0.5y(n-1) - 0.25y(n-2) + x(n) + 0.4x(n-1)$.
8. Distinguish the IIR and FIR filter.
9. What are the stages in pipelining process ?
10. Write the applications of commercial digital signal processor.

PART – B

(5×13=65 Marks)

11. a) Explain the classification of continuous time signals with its mathematical representation. (13)
- (OR)
- b) Describe the different types of system and write the condition to state the system with its types. (13)



12. a) i) Find the Z transform of $x(n) = r^n \cos(n\theta) u(n)$. (9)
 ii) State and prove the Parseval's theorem. (4)
 (OR)
- b) i) Find the circular convolution of the two sequences $x_1(n) = \{1, 2, 2, 1\}$ and $x_2(n) = \{1, 2, 3, 1\}$. (8)
 ii) How do you obtain the magnitude and phase response of DTFT? (5)
13. a) State and prove any four properties of DFT. (13)
 (OR)
- b) Determine the DFT of the given sequence $x(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}$ using DIT FFT algorithm. (13)
14. a) Design a Chebyshev filter for the following specification using bilinear transformation. (13)
- $$0.8 \leq |H_e(j\omega)| \leq 1, 0 \leq \omega \leq 0.2\pi$$
- $$|H_e(j\omega)| \leq 0.2, 0.6\pi \leq \omega \leq \pi$$
- (OR)
- b) Design a filter using Hamming window with the specification $N = 7$ of the system $H_d(e^{j\omega}) = e^{-j3\omega}, \frac{-\pi}{4} \leq \omega \leq \frac{\pi}{4}$; otherwise zero. (13)
- $$\frac{-\pi}{4} \leq \omega \leq \pi$$
15. a) Explain the various types of addressing modes of digital signal processor with suitable example. (13)
 (OR)
- b) Draw the structure of central processing unit and explain each unit with its function. (13)

PART - C

(1×15=15 Marks)

16. a) Determine the frequency response $H(e^{j\omega})$ for the given system and plot magnitude and phase response, $y(n) + \frac{1}{4}y(n-1) = x(n) + x(n-1)$. (15)
 (OR)
- b) Determine the impulse response of the given difference equation $y(n) = y(n-1) + 0.25y(n-2) + x(n) + x(n-1)$. Plot the pole zero pattern and check its stability. (15)