Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 41001

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 proof 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 proof 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)**

$$0.8 \le \left|He^{(j\omega)}\right| \le 1, 0 \le \omega \le 0.2\pi$$

$$\left|He^{(j\omega)}\right| \le 0.2, 0.6\pi \le \omega \le \pi$$

(OR)

b) Design a filter using Hamming window with the specification N = 7 of the system $H_d\left(e^{jw}\right) = e^{-j3\omega}, \frac{-\pi}{4} \le \omega \le \frac{\pi}{4}$; otherwise zero. **(13)**

$$\frac{-\pi}{4} \le \omega \le \pi$$

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 $H\left(e^{jw}\right)$ 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)**

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