Reg. No. :

# Question Paper Code : 51361

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Seventh Semester

Computer Science and Engineering

CS 2403/CS 73 — DIGITAL SIGNAL PROCESSING

(Common to Fifth Semester – Information Technology)

(Regulation 2008)

(Also Common to PTCS 2403 – Digital Signal Processing for B.E (Part-Time) Sixth Semester – Computer Science and Engineering Regulation 2009)

Time : Three hours  Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What do you understand by the term signal processing?

2. What is time invariant system?

3. List any two properties of DFT.

4. What is meant by radix – 2 FFT algorithm?

5. What are the properties of impulse invariant transformation?

6. Draw the direct form structure of IIR filter.

7. What do you understand by linear phase response in filters?

8. What is the reason that FIR filter is always stable?

9. Define upsampling.

10. What is adaptive filter?

PART B — (5 × 16 = 80 marks)

11. (a) Find the Z–transform of the following discrete time signals and find ROC. (8)

(i) $x(n)=[-1/5]^n u(n)+5[1/2]^{-n}u(-n-1)$ (8)

(ii) $x(n)=u(n-2)$

Or

(b) Find whether the following systems are

(i) Linear

(ii) Time invariant

(1) $y(n)=e^{-x(n)}$ (8)

(2) $y(n)=x(n)\cos \omega n$ (8)

12. (a) Find 8–point DFT of the sequence using radix –2 DIT algorithm.

$x(n)=\{1,-1,1,-1,0,0,0,0\}$.

Or

(b) Using radix 2 DIT–FFT algorithm, determine DFT of the given sequence for N=8

$$x(n)\Big\} \begin{matrix} = n \text{ for } 0 \le n \le 7 \\ = 0 \text{ otherwise} \end{matrix}$$

13. (a) (i) Realize the following FIR system with difference equation $y(n)=3/4y(n-1)-1/8y(n-2)+x(n)+1/3x(n-1)$ in direct form I. (6)

(ii) Analyze briefly the different structures of IIR Filter. (10)

Or

(b) Design a digital chebyshev filter using bilinear transformation satisfying the following constraints. Assume T = 1 Sec.

$0.75 \le |H(e^{jw})| \le 1;\ 0 \le w \le \pi/2$

$|H(e^{jw})| \le 0.2;\ 3\pi/4 \le w \le \pi$

14. (a) Design an ideal band reject filter using Hamming window for the given frequency response. Assume N = 11

$$H_d(e^{jw}) = 1; \quad |w| \le \pi/3 \text{ and } |w| \ge 2\pi/3$$

$$= 0; \text{ otherwise}$$

Or

(b) Design an FIR filter for the ideal frequency response using Hamming window with N = 7

$$H_d(e^{jw}) = e^{-j3w}; \quad -\pi/8 \le \omega \le \pi/8$$

$$= 0 \quad ; \pi/8 \le |\omega| \le \pi$$

15. (a) Discuss the application of DSP in image enhancement with few examples.

Or

(b) Discuss the application of multirate signal processing in audio signal processing.