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

Question Paper Code: 36401

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Sixth Semester

Electronics and Communication Engineering

01UEC601 - DIGITAL SIGNAL PROCESSING

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Define DFT for a sequence *x (n).*
2. Why Fast Fourier transform is needed?
3. Compare direct form I and direct form II realizations of IIR system.
4. Sketch the mapping of s-plane to Z-plane in bilinear transformation.
5. What are the advantages and disadvantages of FIR filters?
6. Define Gibb's phenomenon.
7. What is truncation?
8. What is meant by overflow limit cycle?
9. Draw the block diagram of sub coding.
10. Define interpolation and decimation.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) An 8-point sequence is given by x(n) = {2, 0, 2, 0, 4, 2, 4, 0}. Estimate 8 point DFT of x(n) is using radix- 2 DIF-FFT. (8)

    (ii) Apply overlap Add method, Calculate the output y(n) of a filter whose impulse response is h(n) = {1, 1, 1} and input signal x(n) = {3, -1, 0, 1, 3, 2, 0, 1, 2, 1}. (8)

Or

(b) Perform circular convolution for the sequence $x_1(n)=\{1, 1, 2, 1\}$ and $x_2(n)=\{1, 2, 3, 4\}$ using DFT and IDFT. Justify the result by computing in time domain. (16)

12. (a) The specifications of the desired low pass filter is

$0.9 \le |H(e^{jw})| \le 1; \quad 0 \le \omega \le \pi/2$

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

Design a digital butter worth filter using bilinear transformation. Assume T=1sec. (16)

Or

(b) For the analog transfer function $H(s) = \frac{2}{s^2+3s+2}$. Determine *H(z)*using impulse invariant transformation. Assume *T*=1 second. (16)

13. (a) Design a FIR filter with

$H_d(e^{j\omega}) = e^{-j3w}, \quad -\pi/4 \le w \le \pi/4$

$= 0, \quad \pi/4 \le |w| \le \pi$

Determine the $H(e^{j\omega})$ using hanning window function with N=7. (16)

Or

(b) Explain in detail about frequency sampling method of designing an FIR filter. (16)

14. (a) A digital system is characterized by the difference equation y(n)= 0.95y(n-1) + x(n) with x(n)= 0.875, n=0. Assume b=4 bits. Find out limit cycle of oscillation and estimate the dead band of the system. (16)

Or

(b) Describe the Architecture of TMS320C5X with examples. (16)

15. (a) Derive the input output relationship in both time domain and frequency domain of the sampling rate decreased by an integer factor. (16)

Or

(b) Derive the input output relationship in both time domain and frequency domain of the sampling rate decreased by an integer factor. (16)