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

Question Paper Code: 46401

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Sixth Semester

Electronics and Communication Engineering

14UEC601 - DIGITAL SIGNAL PROCESSING

(Regulation 2014)

Duration: 1.15 hrs Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The convolution by FFT is called

   (a) linear convolution (b) circular convolution

   (c) fast convolution (d) slow convolution

2. DFT of δ(n) is--------

   (a) 1 (b) 0 (c) ∞ (d) - 1

3. In impulse invariant method , relationship between ω and Ω is given by,

   (a) $\Omega = \frac{2}{T_s}\tan(\frac{\omega}{2})$ (b) $\omega = \frac{\Omega}{T_s}$

   (c) $\Omega = \frac{1}{T_s}\tan(\frac{\omega}{2})$ (d) $\omega = \Omega T_s$

4. If N_B and N_C are the orders of the Butterworth and Chebyshev filters respectively to meet the same frequency specifications, then which of the following relation is true?

   (a) $N_C=N_B$ (b) $N_C<N_B$ (c) $N_C>N_B$ (d) Cannot be determined

5. Which region of the frequency specification has to be optimized to reduce side lobes of the FIR filter?

(a) Stop band (b) Pass band
(c) Transition band (d) None of these

6. The values of cutoff frequencies in general depend on

(a) Type of the window (b) Length of the window
(c) Neither (a) nor (b) (d) Both (a) and (b)

7. Calculate the improvement of signal to quantization noise ratio with an increase of 2 bits to existing bits.

(a) 2dB (b) 6dB (c) 4dB (d) 12dB

8. Which of the following is not a quantization error occuring in digital systems?

(a) Input quantization error (b) Product quantization error
(c) Coefficient quantization error (d) Output quantization error

9. Which of the following is the disadvantage of sampling rate conversion by converting the signal into analog signal?

(a) Signal distortion
(b) Quantization effects
(c) New sampling rate can be arbitrarily selected
(d) Both (a) and (b)

10. What value should the bandwidth of x(n) has to be reduced in order to avoid aliasing?

(a) F/D (b) F/2D (c) F/4D (d) none of these

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Perform circular convolution of the following sequence. X(n)={-1,1,2,-1,1,2 } and h(n)={2,1,-2}. (8)

12. Design a digital chebyshev filter that satisfying the following frequency response

$0.707 \le |H(e^{j\omega})| \le 1 \qquad for \quad 0 \le \omega \le \frac{\pi}{2}$

$|H(e^{j\omega})| \le 0.2 \qquad for \quad \frac{3\pi}{4} \le \omega \le \pi$

with T=1 sec using impulse Invariant Transformation technique (8)

13. Design a FIR Linear phase, Digital filter approximating the ideal high-pass filter

with a frequency response $H_d(e^{j\omega}) = \begin{cases} 1 & for \frac{\pi}{4} \le |\omega| \le \pi \\ 0 & |\omega| < \frac{\pi}{4} \end{cases}$

(i) Determine the co-efficient of 11 tap filter based on the window method Hanning.
(ii) Determine and plot the magnitude and phase response of the filter. (8)

14. A non-recursive system H (z) is designed such a way that, two Linear phase systems $H_1(z)$ and $H_2(z)$ are connected in cascade. Which are given as $H_1(z) = \frac{1}{1-a_1 z^{-1}}$ and $H_2(z) = \frac{1}{1-a_2 z^{-1}}$. Find the output round off noise power? Assume a_1 =0.5 and a_2 =0.6. (8)

15. Explain in detail about two basic operations in Multirate Signal Processing. (8)