Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: AE306

Course Name: DIGITAL SIGNAL PROCESSING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

1 a) Compute the IDFT of the sequence X(k)={7, -0.707-j0.707, -j, 0.707-j0.707, 1, 0.707+j0.707, j, -0.707+j0.707} using DIT algorithm. (10)

b) Find the transfer function and impulse response of the system described by the difference equation y(n)=1/2 y(n-1)+x(n) (5)

2 a) Explain different type of discrete time systems with example (10)

b) Explain aliasing and why do we need antialiasing filter (5)

3 a) Find the DFT of the sequence x(n)={4,2,0,4}. (5)

b) Find the z transform of $x(n)=(\frac{1}{3})^n u(n) * nu(n)$ (5)

c) Find the cross correlation of the sequences x(n)={1,2,1,1}, y(n)={1,1,2,1} (5)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Compare FIR and IIR filter (5)

b) Design an analog Butterworth filter that has a -2dB pass band attenuation at a frequency of 20 rad/sec and at least -10 dB stop band attenuation at 30 rad/sec (10)

5 a) Design an ideal high pass FIR filter with $H_d(e^{j\omega})=1$ for $\frac{\pi}{4} \leq |\omega| \leq \pi$ (10)

$= 0$ for $|\omega| \leq \frac{\pi}{4}$

Find h(n), H(z), magnitude response for N =10 using Hamming window .

b) Write short note on Hilbert transformers (5)

6 a) Find H(z) from $H(s)=\frac{2}{(s+4)(s+2)}$ using bilinear transformation. Assume T=1sec (5)

b) Derive the frequency response of linear phase FIR filter of order N(even) with the symmetric impulse response (5)

c) Explain analog frequency transformation (5)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Obtain the direct form I, direct form II realization of the system described by the difference equation y(n)+3y(n-1)+y(n-2)+y(n-3)=x(n)+3x(n-1)+4x(n-2)+5x(n-3). (10)

b) Describe the operation of a typical MAC configuration in DSP (5)

c) Write note on superscalar architecture (5)

8 a) Explain about the quantization error due to the finite word length registers in digital filters. (5)

b) Realize the following FIR system function using minimum number of multipliers (5)

H(z)=$\{1+\frac{1}{4}z^{-1}+\frac{1}{2}z^{-2}+\frac{1}{2}z^{-3}+\frac{1}{4}z^{-4}+z^{-5}\}$

c) Draw and explain the architecture of TMS 320C 5X (10)

9 a) Write notes on the following quantization errors (5)

1. Truncation error
2. Round off error

b) Explain (10)

1. Difference between von-Neumann architecture and Harvard architecture
2. Special instruction for DSP processor

c) Realize the system in parallel form described by the difference equation (5)

y(n)=-0.1y(n-1)+0.72y(n-2)+0.7x(n)-0.252x(n-2)

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