

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2171003
Date:27/05/2019
Subject Name:Digital Signal Processing
Time:02:30 PM TO 05:00 PM
Total Marks: 70
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Check whether the given signal is periodic or not? $X[n]=\sin(0.2n+\pi)$	03
	(b) Prove the differentiation property of DTFT.	04
	(c) $y[n]=5x[n-10]$ check whether the system is linear time invariant causal and stable or not?	07
Q.2	(a) What do you mean by filter coefficient quantization effect explain?	03
	(b) Compare the minimum phase and non-minimum phase system.	04
	(c) Define the inverse system, how to make non invertible system to an invertible system.	07
	OR	
	(c) Find out all pass minimum phase description of given system.	07
	$H_1(z) = \frac{1+3z^{-1}}{1+\frac{1}{2}z^{-1}}$	
Q.3	(a) Find out an impulse response of a system described by difference equation. $y[n]-ay[n-1]=x[n]$	03
	(b) Draw the direct form-I implementation of the given system transfer function. $(1+2z^{-1}+z^{-2})/(1-0.75z^{-1}+0.125z^{-2})$	04
	(c) 1-Find out the IDTFT of Ideal low pass response. 2-Explain the adaptive beam forming using block diagram.	07
	OR	
Q.3	(a) Find out the Fourier transform of $f(t) = e^{-at} t $ (with $a > 0$)	03
	(b) Draw the direct form-II implementation of the given system transfer function. $(1+2z^{-1}+z^{-2})/(1-0.75z^{-1}+0.125z^{-2})$	04
	(c) Find out the Z transform of $x[n]=\{n(-1/2)^n u(n) X(1/4)^{-n} u(-n)\}$	07
Q.4	(a) Draw cascade form implementation of given system $(1+2z^{-1}+z^{-2})/(1-0.75z^{-1}+0.125z^{-2})$	03
	(b) Convert the given Analog Filter in to the digital filter using impulse invariance technique. $H_a(s)=(s+a)/\{(s+a)^2+b^2\}$	04
	(c) Compare Type-1, Type-2, Type-3 and Type-4 FIR Filter	07

- Q.4**
- (a) Explain the impulse invariance transformation **03**
 - (b) Compare, Hamming window with Blackman window **04**
 - (c) Design the IIR Butterworth filter to meet the following specifications **07**
using bilinear transformation.
 $0.8 \leq |H(e^{j\omega})| \leq 1$ for $0 \leq \omega \leq 0.2$
And $|H(e^{j\omega})| \leq 0.2$ for $0.6 \leq \omega \leq \pi$

- Q.5**
- (a) What is the difference between decimation in time and decimation in frequency? **03**
 - (b) Using the decimation in time find DFT of four point sequence $\{1, 2, 3, 4\}$ **04**
 - (c) Explain how the decimation in time technique works with necessary equations and diagrams. **07**

OR

- Q.5**
- (a) Describe how the system identification works? **03**
 - (b) Compare Up Sampling and Down Sampling. **04**
 - (c) Explain about DSP processor architecture. **07**

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