Seat No.: _____ Enrolment No._____

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. $H_1(z)=\frac{1+3z^{-1}}{1+\frac{1}{2}z^{-1}}$	**07**
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 $f(t) = e^{-a\|t\|}$ (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. $Ha(s)=(s + a) /\{(s + a)^2 + b^2\}$	**04**
	(c)	Compare Type-1, Type-2, Type-3 and Type-4 FIR Filter	**07**

OR

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 using bilinear transformation. $0.8 \leq \lvert H(e^{jw}) \rvert \leq 1$ for $0 \leq w \leq 0.2$ And $\lvert H(e^{jw}) \rvert \leq 0.2$ for $0.6 \leq w \leq \pi$	**07**
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**

****