

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

**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 **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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