

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019

Subject Code: 2170914

Date: 23/11/2019

Subject Name: Digital Signal Processing

Time: 10:30 AM TO 01:00 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) Define the given terms in context of signal processing. (1) Energy signal (2) Linear system	03
	(b) Compare Causal and non Causal system with example.	04
	(c) What do you mean by Digital Signal Processing (DSP)? Draw general block diagram of DSP and also write its applications.	07
Q.2	(a) What is minimum phase system? Explain in brief.	03
	(b) Explain need of linear convolution with one example.	04
	(c) What is Discrete Fourier Transform(DFT)? Why it is periodic? Explain regarding its periodicity property.	07
	OR	
	(c) Explain Z- transform with applications and prove any one property of Z- Transform.	07
Q.3	(a) What is up sampling and down sampling? Give one application of that.	03
	(b) Compare IIR and FIR filters.	04
	(c) What is BIBO stable system? Give derivation in support to the necessary condition for BIBO stable system.	07
	OR	
Q.3	(a) Find Z- Transform of $x(n) = -a^n u(-n-1)$	03
	(b) For the following system, check for the linearity, time variant, causality and stability. (1) $y(n) = x(n) + nx(n+1)$ (2) $y(n) = x(-n+2)$	04
	(c) If $y(n) = 0.85y(n-1) + 0.15x(n)$ is system difference equation then find output for input $x(n) = u(n)$.	07
Q.4	(a) Find DFT of the unit sample $\delta(n)$. Write your comment on that.	03
	(b) What is linear phase system?. Give any one example of it and draw its structure.	04
	(c) Find linear and circular convolution of the sequences $x(n) = \{1, 2, 3, 4\}$ and $h(n) = \{2, 1, 2, 1\}$. Compare it and write your comment.	07
	OR	
Q.4	(a) What is frequency domain sampling? Why it is required?	03
	(b) Briefly explain effect of coefficient quantization in filters.	04
	(c) Draw Direct form-I and Direct form-II structure for the function	07

$$y(n) = x(n) + 0.3x(n-1) - 0.4x(n-2) - 0.8y(n-1) + 0.7y(n-2)$$

Compare both the structure for hardware requirement.

- Q.5**
- (a) What is adaptive filtering? Where it can be used? **03**
 - (b) Find out $H(z)$ for the given $H(s) = 2/(s^2 + 3s + 2)$ using impulse invariance method. Take $T = 1s$ **04**
 - (c) Explain the Decimation in Time FFT algorithm. **07**

OR

- Q.5**
- (a) Compare Direct Form I and Direct form II. **03**
 - (b) Compare any two Windowing techniques used in FIR filter. **04**
 - (c) State and prove Parseval's relation for DTFT. **07**

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